Using Predictive Models to Move Medicaid Providers Toward Best Practices and Reduce Waste

Predictive Modeling Summit

Gary Redding, Vice President and Practice Leader, Thomson Reuters

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AGENDA

- Thomson Reuters
- Using Predictive Models to Move Medicaid Providers Toward Best Practices and Reduce Waste
- Questions and Discussion

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Gary Redding, Vice President and Practice Leader, Thomson Reuters

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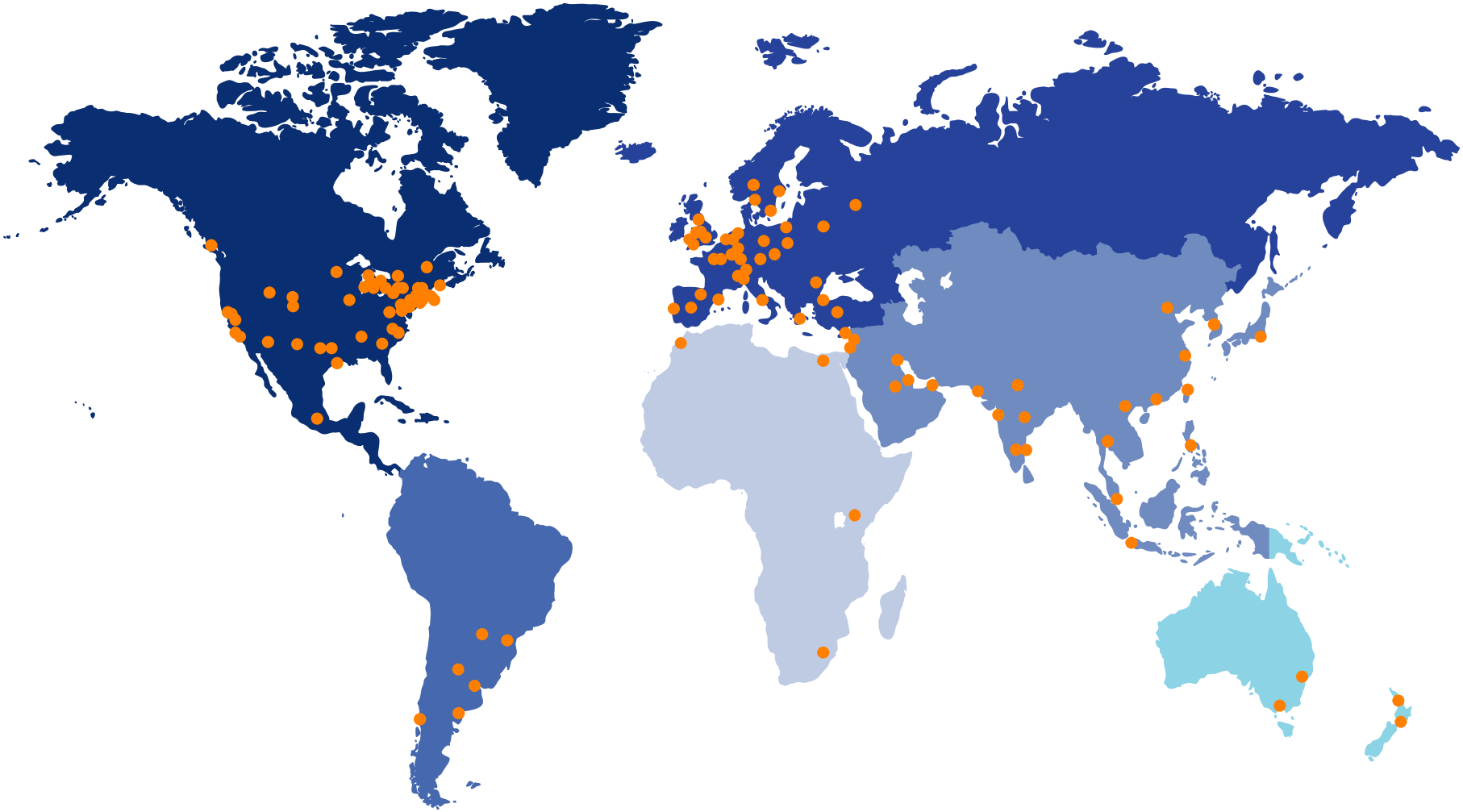

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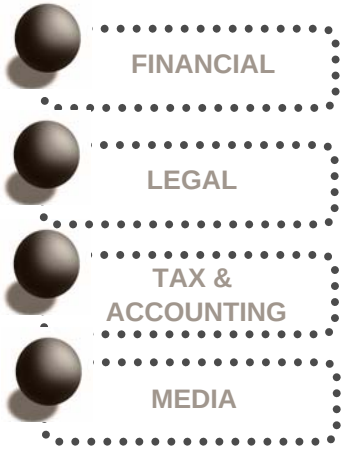

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CIGNA, Paramount, Emblem, Humana, Numerous BCBS plans

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Pharma

State Government

11 state employers
28 Medicaid agencies
8 HHS agencies

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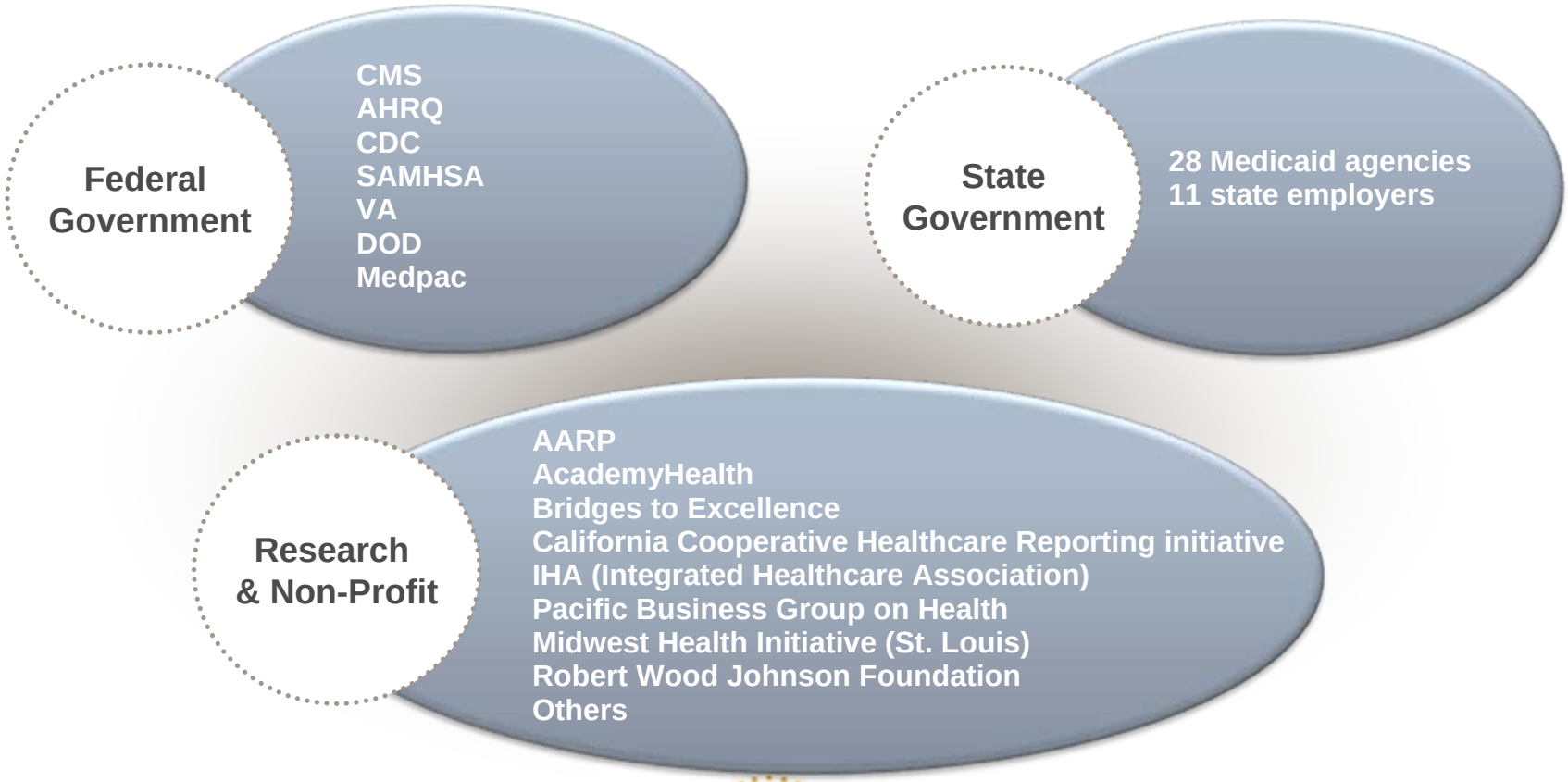
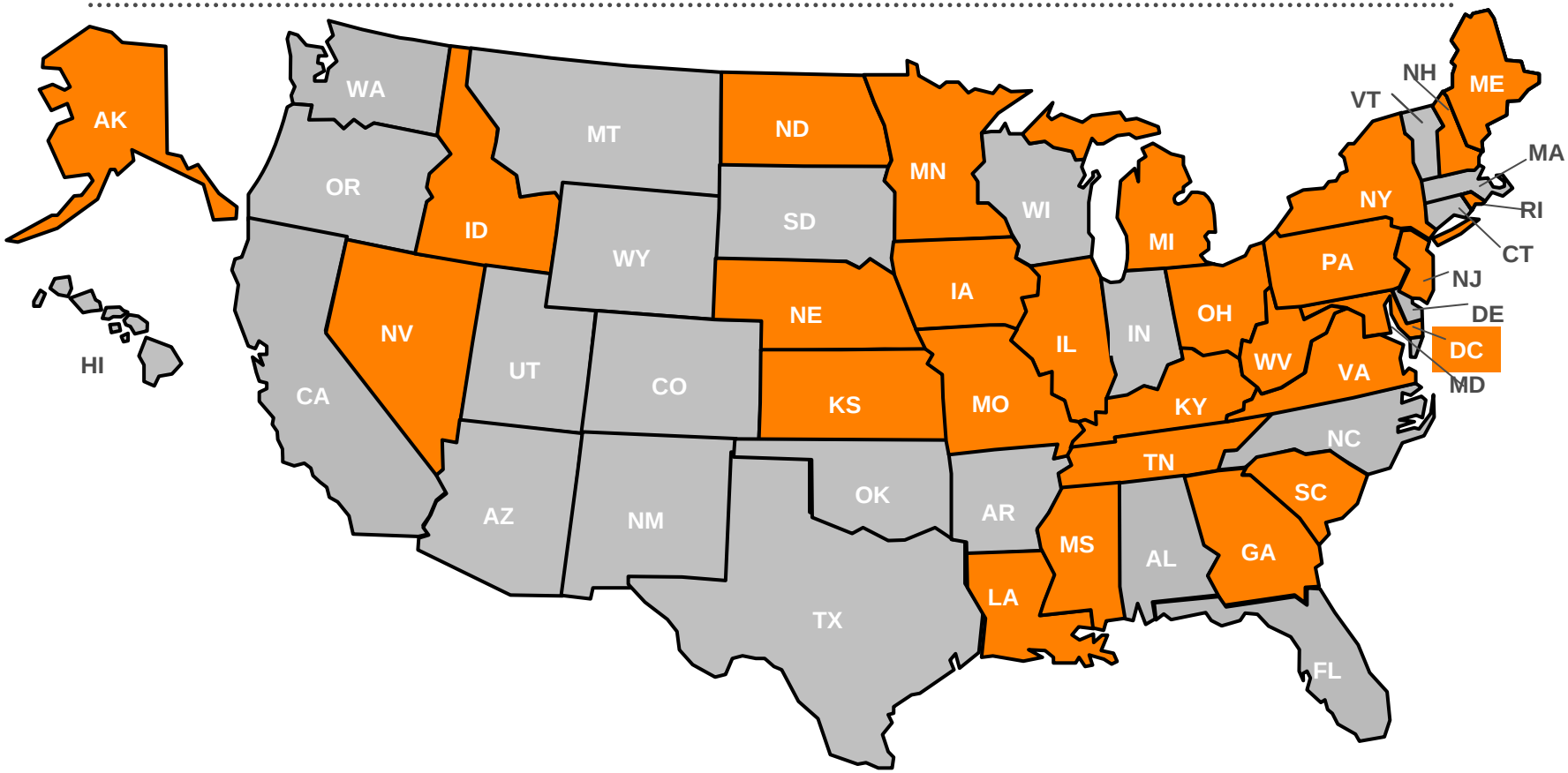


Medicaid Customers



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- Formulate payment policy
- Launch cost control strategies
- Support prevention programs
- Answer any healthcare program question

Using Predictive Models to Move Medicaid Providers Toward Best Practices and Reduce Waste

Michelle McAllister, Consulting Manager, Thomson Reuters

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Overview

- Context
  - What is Predictive Modeling?
  - History of Predictive Modeling
- How it Works
  - Predictive Modeling Basics
  - A Useful Approach to Predictive Modeling and Targeting
- Case Studies: Applications in Moving Providers Toward Best Practices and Reduce Waste

Context

What is Predictive Modeling?

- Use of demographic, diagnostic, and utilization information, with analytic models to predict:
  - Beneficiaries who will be high-risk/high-cost in the future
  - Future costs
  - Future utilization
  - Influence Best Practices
  - Help Reduce Waste

… in order to better intervene, manage risk, ensure quality and set rates

History of Predictive Modeling

- Research began on health-based risk models

- Health Insurance Plan of California (HIPC) implemented a homegrown risk adjustment model
- State of Washington Employees and State of Colorado's Medicaid program used risk adjustment for payments

- 1st Society of Actuaries study comparing several different risk models and risk adjusters.

- Balanced Budget Act – mandated risk-adjusted payments for Medicare+Choice for year 2000 (Principal Inpatient Dx Model)

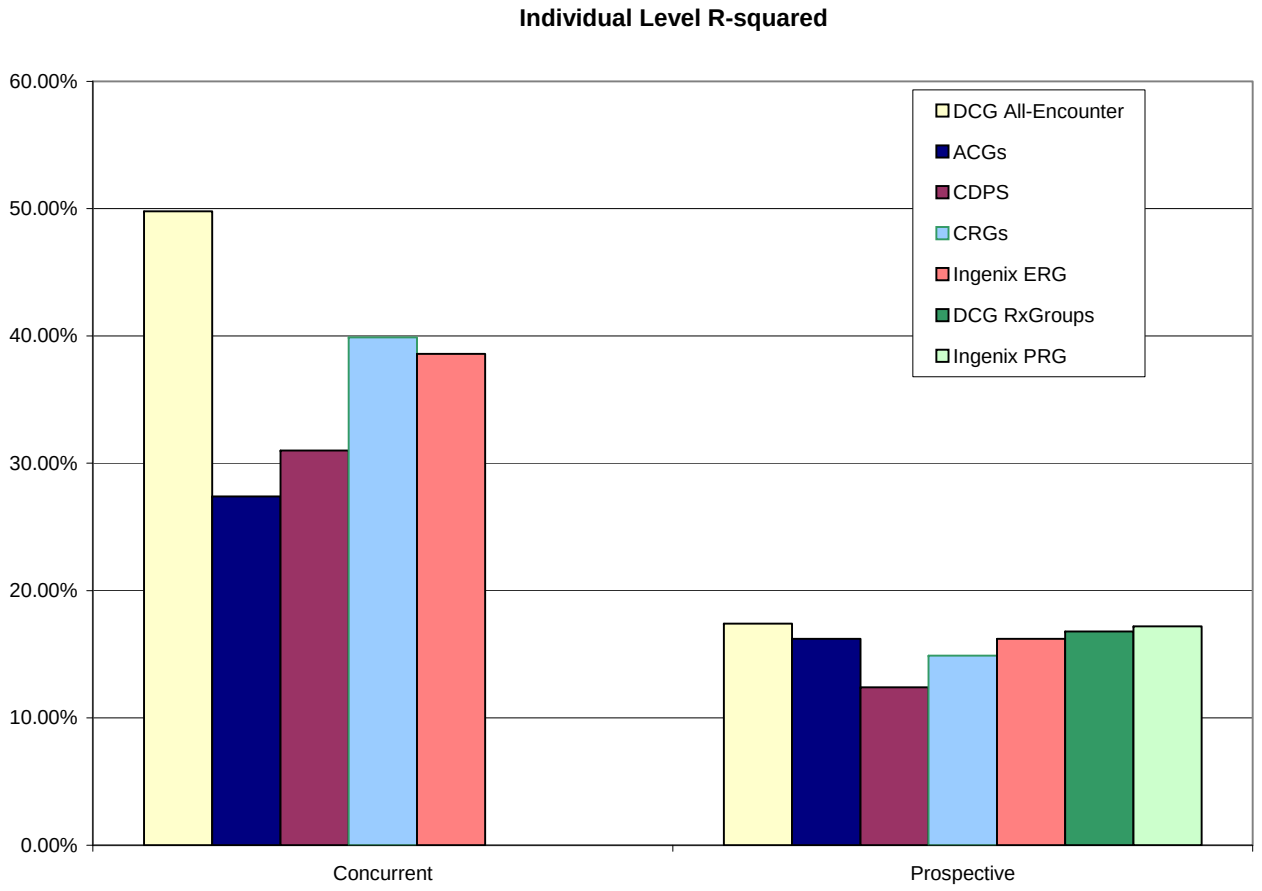
History of Predictive Modeling (cont.)

- 2nd Society of Actuaries study comparing several different risk models and risk adjusters. DCGs chosen best in class.
- CMS selects an 'all encounter model'
- 3rd Society of Actuaries study comparing several different risk models and risk adjusters. DCGs chosen best in class. 12 models tested.

History of Predictive Modeling (cont.)

*** R squared**

Explains predictive value. A higher R squared equates to a better degree of predictability.



Society of Actuaries, "A Comparative Analysis of Claims-based Methods of Health Risk Assessment for Commercial Populations," 2007

How it works

Predictive Modeling Basics

- Most models are designed to require 1 year's worth of enrollment and medical and/or pharmacy data.
- Purpose Varies
  - Predictive Modeling in Pricing
    - Identify difference in cost between people and groups to price accordingly
  - Predictive Modeling in Care Management
    - Resource use and intensity is the focus

DCGs

- Thomson Reuters currently utilizes Diagnostic Cost Groups (DCGs)
  - DCGs are a population-based classification and risk adjustment methodology
  - Developed and licensed by Verisk Health Inc.
  - Selected by CMS for the Medicare Choice Program

DCG Models in Advantage Suite	
Population Group	**Variant**
Medicare	All - encounter
Medicaid	All - encounter
Commercial	All – encounter
	Rx Groups – Rx/Inpatient
	Rx Groups – Rx Only
	Etc.

The DCG models work by:

- Classifying raw administrative (medical and/or pharmacy claims as well as eligibility and aid category) data into coherent clinical groupings
- Applying clinically valid hierarchies and interactions to create an aggregated, empirically valid patient score at the individual beneficiary level
- Correlating the scores with the cost of the health burden carried by the beneficiary
- Aggregating individual scores by groups of interest creates group-level predictive results specific to many Medicare/Medicaid applications

Medical Episode Grouper (MEG)

What is an episode?

- An episode is all care for a course of treatment of a disease
  - Primary and secondary diagnosis codes grouped into one of 560 disease categories
  - Stratified by severity of illness
  - Disease categories and clinical criteria specified by physicians at Jefferson Medical College
- Includes inpatient, outpatient and drug claims
  - Not every claim is assigned an episode
- Also includes admissions
- Patients may have more than one episode at any given time

MEG Clinical Criteria with Description, Diagnostic Findings and ICD-9-CM codes

Episode Group: 13 Essential Hypertension, Chronic Maintenance — Clean Period: Chronic

Etiology: Degenerative; Genetic (or hereditary); Idiopathic — Summary Group: Hypertension, Essential (285)

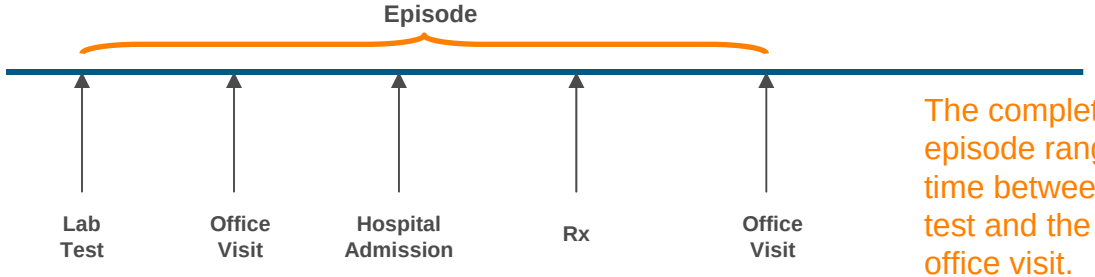
Stage	Description	Diagnostic findings	ICD-9-CM Codes
1.01	Hypertension, minimal	History of minimal hypertension OR Diastolic pressure ≥ 90 mmHg on three separate readings within one month AND diastolic pressure < 100 mmHg on three separate readings within one month OR history of diastolic pressure ≥ 90 mmHg on three separate readings AND history of diastolic pressure < 100 mmHg on three separate readings OR systolic pressure ≥ 140 mmHg on three separate readings within one month AND systolic pressure < 160 mmHg on three separate readings within one month	DX 4011, 4019;
1.02	Hypertension, moderate	History of moderate hypertension OR diastolic pressure ≥ 100 mmHg on three separate readings within one month AND diastolic pressure < 110 mmHg on three separate readings within one month OR history of diastolic pressure ≥ 100 mmHg on three separate readings AND history of diastolic pressure < 110 mmHg on three separate readings OR systolic pressure ≥ 160 mmHg on three separate readings within one month AND systolic pressure < 180 mmHg on three separate readings within one month	DX 40300, 40310, 40390;
1.0		History of severe hypertension OR Diastolic pressure ≥ 110 mmHg on three separate readings within one month AND diastolic pressure < 120 mmHg on three separate readings within one month OR history of diastolic pressure ≥ 110 mmHg on three separate readings AND history of diastolic pressure < 120 mmHg on three separate readings OR systolic pressure ≥ 180 mmHg on three separate readings within one month AND systolic pressure < 210 mmHg on three separate readings within one month	NO;
2.01	Hypertension, very severe	Diastolic pressure ≥ 120 mmHg OR systolic pressure ≥ 210 mmHg	DX 4010;
2.02	Hypertensive retinopathy, Grade I or II of Keith and Wagener	Stage 1.02-2.01 AND A-V nicking [fundoscopy report] OR copper wire' vessels [fundoscopy report] OR narrowing of arterioles [fundoscopy report] OR Grade I Keith and Wagener retinopathy [fundoscopy report] OR Grade II Keith and Wagener retinopathy [fundoscopy report]	DX 36211;
2.03	Hypertensive retinopathy, Grade III or IV of Keith and Wagener	Stage 1.02-2.02 AND retinal hemorrhage [fundoscopy report] OR retinal exudates [fundoscopy report] OR Grade III Keith and Wagener retinopathy [fundoscopy report] OR Grade IV Keith and Wagener retinopathy [fundoscopy report]	STAGE 1.01-2.02 + (DX 36281-36282);

MEG provides clinically relevant grouping

MEG: Grouping Methodology

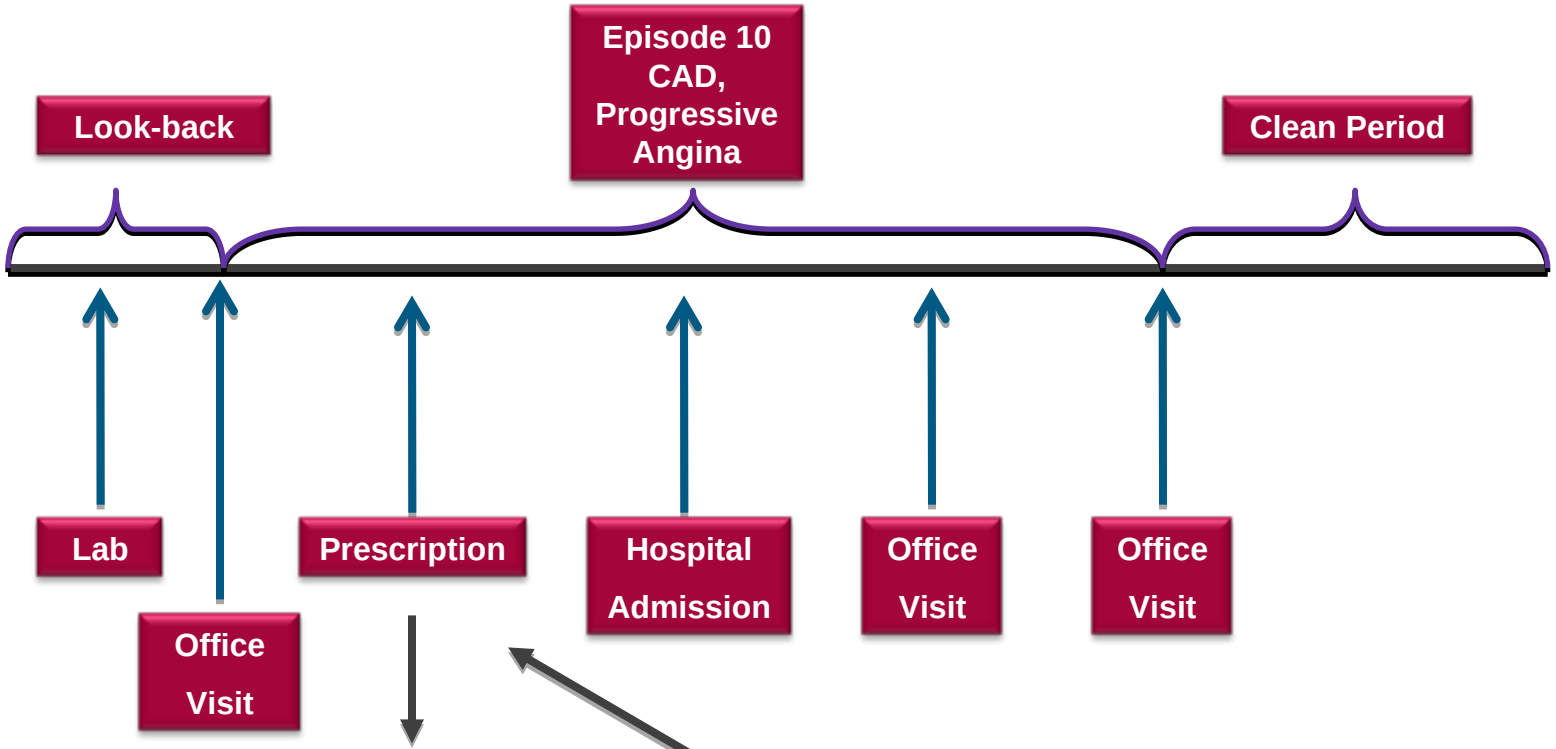
Appropriately group claims into episodes according to disease category and relative time between services

- **Classification -** Diagnosis codes from healthcare claims and other administrative data are grouped into one of the over 550 Disease Staging disease categories and severity stages.
- **Beginning and Ending Episodes -** Clean periods unique to each disease category are used to group each claim into an episode.
- **Inclusion Logic -** Less specific episode groups occurring in close proximity to specific episodes are combined with the specific episodes, e.g. “other gastrointestinal or abdominal symptoms" and "appendicitis".
- **Drug Data -** Mappings of National Drug Codes (NDCs) to episode groups enables pharmacy claims to be grouped to relevant episodes.
- **Lookback Procedure -** Lab and diagnostic imaging claims preceding an episode are examined to determine whether they should be combined with the episode.



The complete episode ranges in time between the lab test and the final office visit.

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

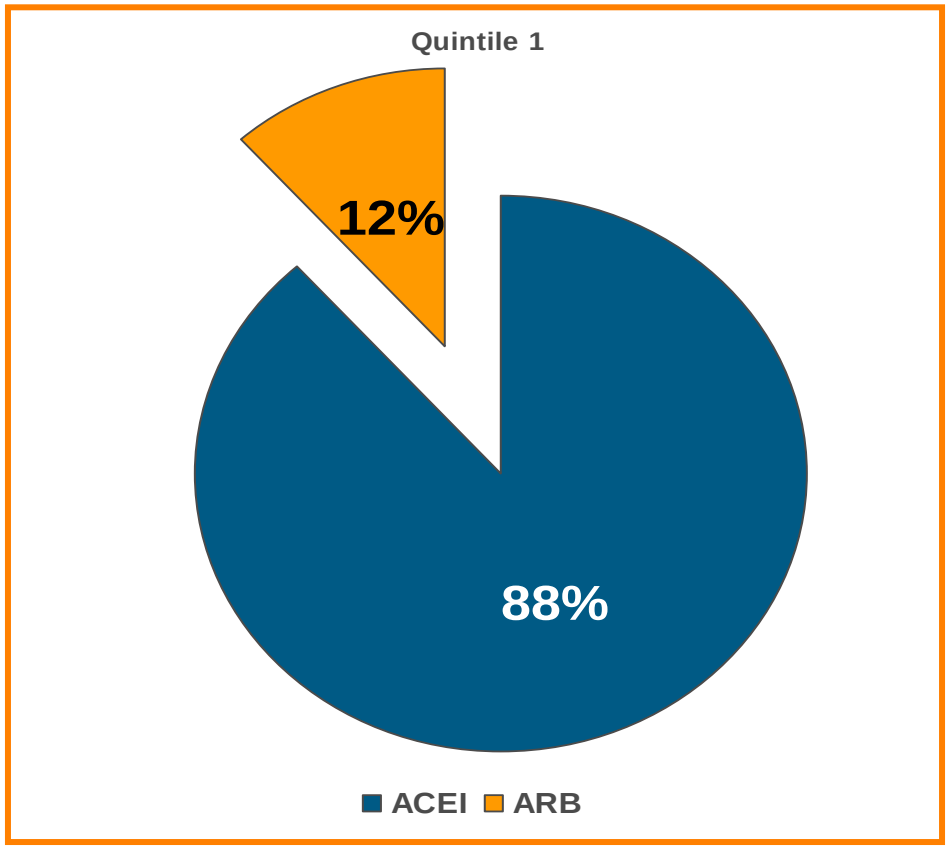
NDC	EPGRP
ISDN	10
INSUL	359
INSUL	360
INSUL	361
AMOX	484
AMOX	86

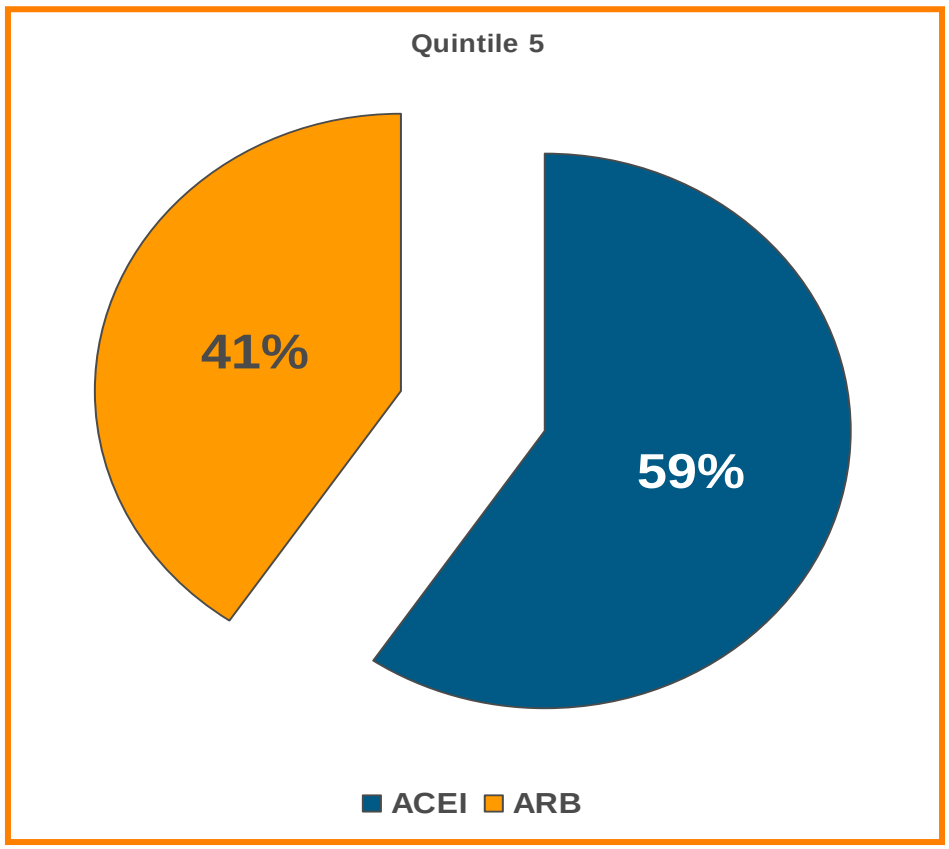
Medical Episode Grouper (MEG)

What is the analytic value of using episodes?

- Attributes all costs to diseases
  - Particularly prescription drugs
- **Finds a physician that is accountable for treatment**
  - **Managing Physician**
    - Identifies the physician who guided treatment usually providing multiple E & M visits
    - Use to identify the decision-maker in a patient's care
  - **Primary Physician**
    - Identifies the physician with the highest costs
    - Use to evaluate if specific episode costs
- Measures and compares the costs of treating disease
  - Which providers and plans are most efficient
  - Both price and resource consumption

MEG: Potential Drug Substitutions – ACEI vs. ARB





- ARB has no generic substitute and is more costly than therapeutically similar ACEI.
- Quintile 5 patients are more likely to receive an ARB.

MEG:
Variation and Cost of Antithrombotic Treatment

- People prescribe/take antithrombotics for hypertension to lower risk of ischemic event – "it makes sense."
- Aspirin/antiplatelet *is* recommended for *secondary* prevention of ischemic event.
- However:
  - Warfarin not recommended.
  - Antiplatelet therapy not recommended for primary prevention, as risk of hemorrhage is greater than risk reduction of ischemic event.

Cost of Antithrombotic Drugs for *Primary* Prevention

Quintile 1	$3,686
Quintile 5	$213,962

Lip GYH, Felmeden DC. Antiplatelet agents and anticoagulants for hypertension. Cochrane Database of Systematic Reviews 2004, Issue 3. Art. No.: CD003186. DOI: 10.1002/14651858.CD003186.pub2

Episodes and Patient-Level Adjustment

- 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

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

A Useful Approach to Predictive Modeling and Targeting: Risk Adjusted Episodes

What is Risk Adjusted Episodes?

- *An improved method of benchmark adjustment in Decision Analyst that combines the disease and severity strength of MEG with the population-based risk adjustment power of the DCG grouper*

- **Basing risk adjustment on average episode costs ignores significant risk factors which physicians take into account when treating a patient.**
  - Age and gender
  - Comorbidities
- **Basing risk adjustment on a single illness burden score (for the patient) ignores vital information about diseases and severity levels.**
  - Risk adjustment using illness burden accounts for the risk of a population across all conditions, but is not enough to determine expected costs for a specific condition.
- **Combining episodes and illness-burden methodologies addresses the shortcomings of each.**

The Problem

Michael

Progressive Angina
2005 Costs ~ $15,323

62 year old, Male

Comorbidities
- Renal failure
- Deep vein thrombosis
- Impaired fasting glucose
- Asthma

Relative Risk Score = 56.38

Diane

Progressive Angina
2005 Costs ~ $5,974

58 year old, Female

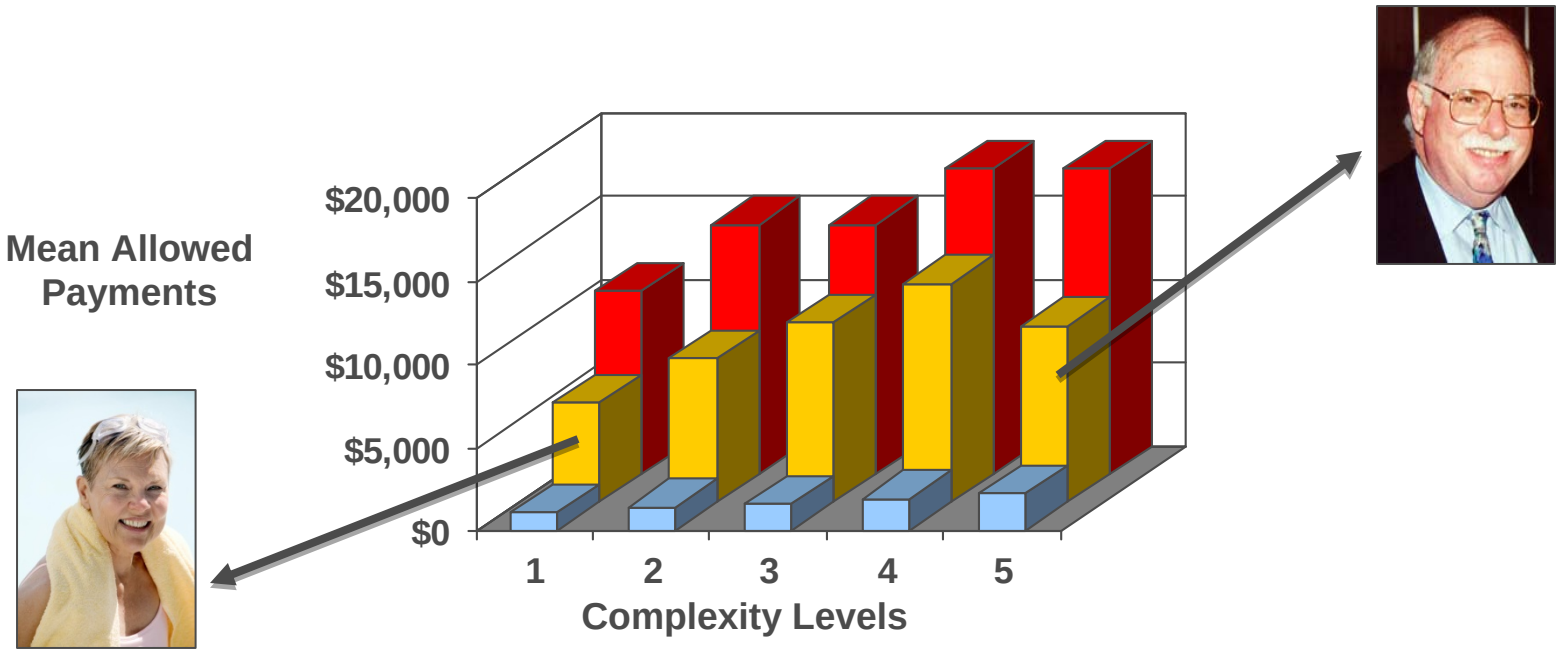
Comorbidities
- Hypertension, minimal

Relative Risk Score = 5.54

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

...due to different comorbidity profiles.

Dimensions of Risk that Drive Episode Cost



To fairly compare physicians on cost of care, differences in complexity levels need to be considered

Source: Based on ~ 100 Million Claims, 2003-2004

Risk Adjusted Episodes

- The method is intuitive and easy to explain to physicians / clinicians
- It does a better job at an individual physician-level of accounting for that physician's mix of patients / severity
- It has potential for improvements in predictive power

Risk Adjusted Cost Profile for Cardiology Episodes

Physicians	# Episodes	Episode Cost Scale (avg=100)	Actual Costs Per Episode	Expected Costs Per Episode		Performance Ratio	
				Before	After	Before	After
Jones	77	159	$6,426	$5,075	$5,196	1.27	1.24
Harris	75	115	$2,106	$3,018	$2,875	0.70	0.73
Davis	72	159	$4,983	$5,690	$5,917	0.88	0.84
Brown	62	80	$838	$1,537	$1,459	0.55	0.57
Wilson	62	83	$1,001	$1,501	$1,492	0.67	0.67
Smith	61	167	$5,667	$5,746	$5,851	0.99	0.97
Gold	58	86	$816	$1,557	$1,592	0.52	0.51
Murphy	57	158	$3,710	$5,646	$5,329	0.66	0.70
Evans	53	110	$2,653	$2,990	$2,858	0.89	0.93
Ford	**53**	**91**	**$2,671**	**$1,818**	**$1,994**	**1.47**	**1.34**

Source: Based on subset of Marketscan Commercial data, 2002-2004

Risk Adjusted Cost Profile for Dr. Ford

Episode Group	Stage	Episodes	Actual Costs Per Episode	Expected Costs Per Episode		Performance Ratio	
				Before	After	Before	After
Arrhythmias	1.01	1	$226	$1,217	$1,295	0.19	0.17
Congestive Heart Failure	3.01	1	$391	$6,474	$8,525	0.06	0.05
Angina Pectoris	1.01	2	$18,816	$4,632	$4,664	4.06	4.03
Angina Pectoris	1.02	1	$36,638	$7,583	$7,897	4.83	4.64
Angina Pectoris	2.04	1	$23,794	$22,033	$28,480	1.08	0.84
Essential Hypertension, Chronic Maint	1.01	45	$870	$1,057	$1,057	0.82	0.82
Other Cardiovascular Symptoms	1.01	2	$1,876	$1,128	$1,290	1.66	1.46
TOTALS		**53**	**$2,671**	**$1,818**	**$1,994**	**1.47**	**1.34**

Source: Based on subset of Marketscan Commercial data, 2002-2004

Risk Adjusted Cost Profile for Dr. Ford (patient detail)

Episode Group	Stage	Patient	Actual Costs Per Episode	Expected Costs Per Episode		DCG Relative Risk Score	
				Before	After	Actual	Average
Congestive Heart Failure	3.01	Jim	$391	$6,474	$8,525	16.08	7.04
Angina Pectoris	2.04	Adam	$23,794	$22,033	$28,480	4.46	4.36
Other Cardiovascular Symptoms	1.01	Sarah	$3,535	$1,128	$1,176	2.60	1.55
Other Cardiovascular Symptoms	1.01	Dave	$218	$1,128	$1,403	8.22	1.55

Using the 69 providers with at least 10 episodes as a sample, no provider's performance ratio changed by more than 0.15.

Using all 149 providers as a sample, 71% of performance ratios changed by 0.05 or less.

In general, only modest changes are expected when using Risk Adjusted Episodes for dynamic benchmarks (slightly more variance for Marketscan benchmarks).

Source: Based on subset of Marketscan Commercial data, 2002-2004

Case Studies

Moving Medicaid Providers Toward Best Practices and Reduce Waste

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Provider Profiling with Risk Adjusted Episodes

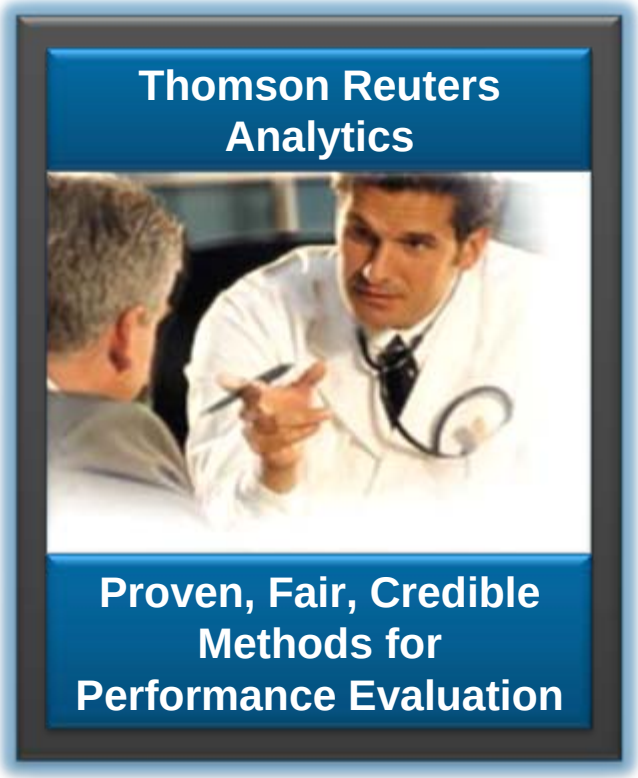
- Blue Cross Blue Shield Plan was charged with developing risk-adjusted provider profiles for both internal and external profiling goals.
- Thomson Reuters combined patient-level risk scores from the Diagnostic Cost Grouper (DCG) with the severity score from Thomson Reuter's Medical Episode Grouper.
- Eliminates the potential of rewarding physicians who care for patients with few co-morbid diseases while penalizing physicians who care for patients with a significant illness burden.
- Results: BCBS used information during contract negotiations, and supplied providers with actionable goals and recommendations.

Provider Performance and Gaps in Care

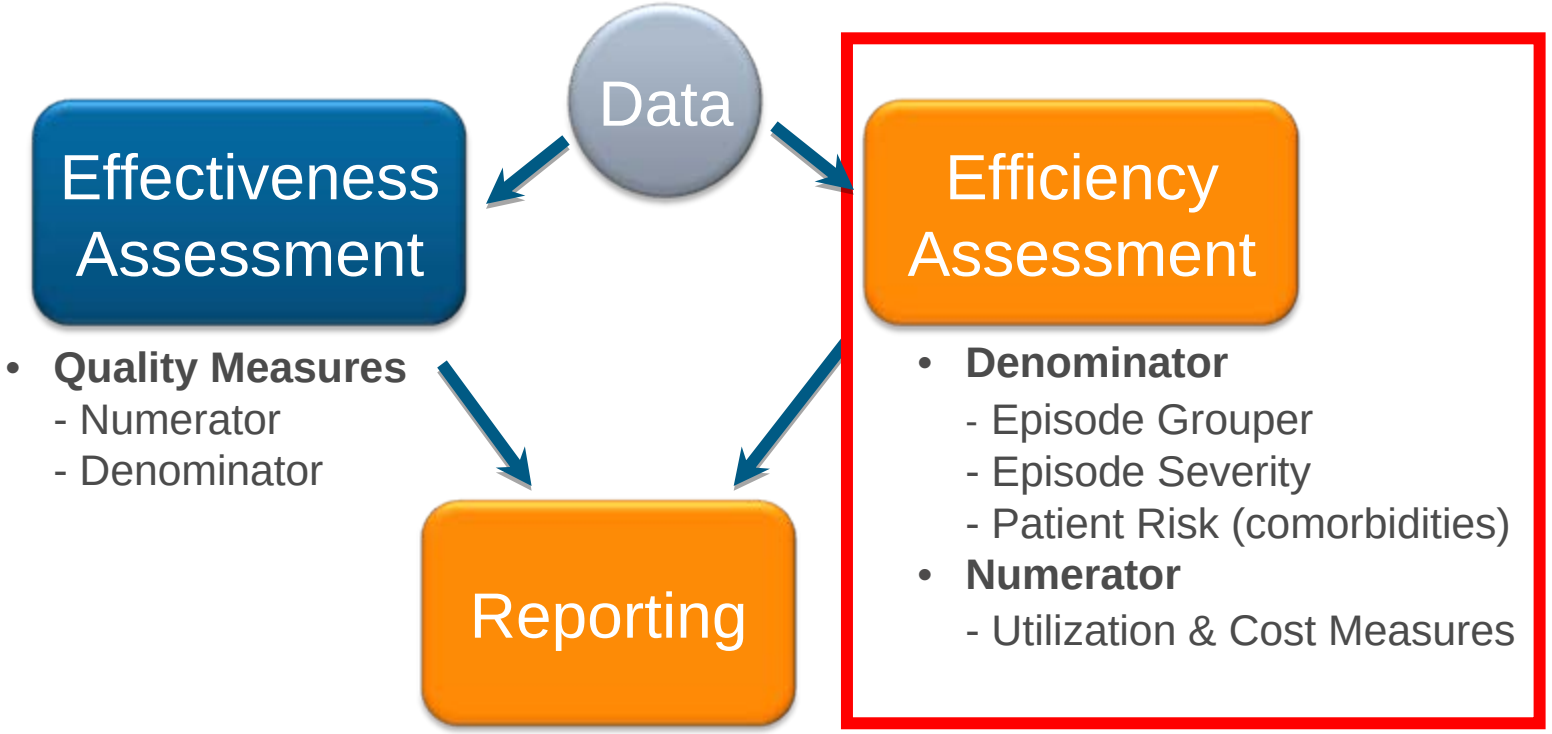
- Thomson Healthcare and APS Health Systems are partnering to assist a State Medicaid agency in using data to create meaningful internal and external analyses to evaluate provider performance and create an action plan to address any gaps.
- Maintain healthcare utilization review system specific to disease/risk status – based on updated guidelines & evidence based medicine
  - Advantage Suite with MEG, DCGs, Patient Health Record
  - Physician Performance Assessment Module

PHYSICIAN PERFORMANCE ASSESSMENT: CORE METHODS & CAPABILITIES

- ***Efficiency (Affordability) Measures***
  - Medical Episode Grouper (MEG)
  - Disease Staging Severity Model
  - DCG Risk-Adjusted
- ***Effectiveness (Quality) Measures***
  - Nationally adopted evidence-based measures
  - Custom measures as appropriate
- ***Analysis and Reporting***
  - Physician Identification
  - Physician Attribution
  - Other Methods and Analytics
  - Measure Reliability and Stability
  - Reporting and Distribution



A FRAMEWORK FOR PHYSICIAN PERFORMANCE MEASUREMENT



Thomson Healthcare's Intelligence: EBM

Claims Administrative Rules

Sets of procedures and billing activities governing the administrative rules for payment

Peer Group Practice Norms

Comparisons among providers or patients that identify deviations from peer group normative behavior

Evidence-Based Medicine

The conscientious and judicious use of current best evidence from clinical and outcome research for the management of individual patients

Determination of Appropriateness

Predictive Modeling in Program Integrity

- There is no application that can "predict" future fraud and abuse
  - Providers and Beneficiaries cannot be prosecuted for future possibilities
- When are Program Integrity and Predictive Modeling linked?
  - By looking at past experience states can predict which types of provider services, which regions of the state, or other variables that predict more likely yields of fraud or abuse cases
    - This type of predictive modeling definition is currently being popularized in law enforcement for deployment of police to areas of the city that have a history of particular crimes at particular times.
  - Compiling several red flags or indicators of potential F&A and applying a score to a provider over the multiple indicators
  - Prepayment flags that scored providers in various levels of upcoding, unbundling, or improper billings only look at incoming claims and don't look at the whole picture of paid claims across all databases
  - Prepayment Editing predicts inappropriate billings and denies the claims before payment

Questions & Discussion

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