MATHEMATICA
CENTER FOR
IMPROVING RESEARCH EVIDENCE

Improving Public Programs: Advanced Analytics for Better Decision Making

Center for Improving Research Evidence (CIRE) Forum
Washington, DC

May 20, 2015

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Stuart Buck • Jeffrey Ballou • Irma Perez-Johnson • David Weaver
J.B. Wogan • Jennifer Brooks • Scott Cody • Mark Peterson

Welcome

Ann Person, CIRE director

About CIRE

- Designs and uses an array of scientific research and evaluation approaches in diverse settings
- Has more than 40 years of experience conducting a wide range of rigorous applied research using cutting-edge qualitative and quantitative methods
- Strives to bridge the gap between policy research and practice

Forum Roadmap

- Panel 1: Introduction to Advanced Analytics
- Panel 2: Analytics in Action
- Panel 3: The Analytics Frontier

Advanced Analytics: What It Is and Why It's Important

Myles Maxfield, Mathematica

Advanced Analytics—What Is It?

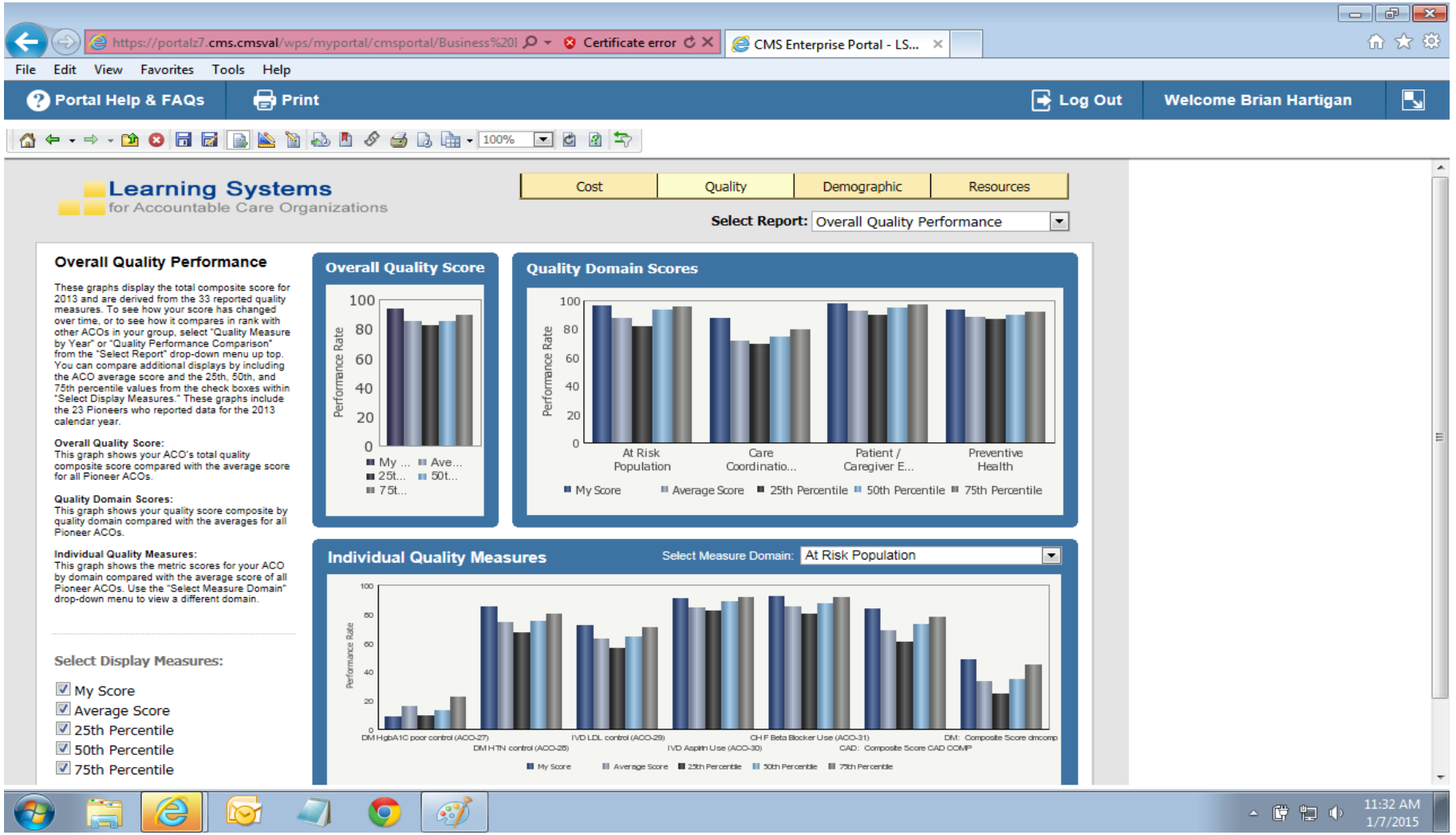
Data Analytics—What Is It?

- Google Maps is not analytics; Google Maps with the traffic layer is analytics
- Data analytics and big data are not synonyms

Basic Analytics—What Is It?

- Decision support in near-real time
- Metrics linked directly to decisions
- Descriptive data presented accessibly
  - Graphical: understand the analytic findings at a glance
  - Interactive online dashboards
- Operational: embedded in production systems

Health Care Quality Dashboard for Accountable Care Organizations



Advanced Analytics—What Can It Do?

- Forecast performance
- Predict an outcome variable that is not observed
- Generate a hypothesis, as opposed to testing a hypothesis
- Make rapid-cycle experimentation possible

Advanced Analytics Methods

- Forecasting models
- Predictive models
- Simulation models
- Network models
- Machine-learning models
- Data mining
- Text mining, natural language processing
- Pattern recognition
- Outlier/anomalies detection
- Signal processing
- Operations research
- Geospatial analysis

Why Is It Important? Examples in Health (1)

- Predict fraud and abuse now that payment amounts are determined by both claims and quality data (quality data is a new venue for cheating)
- Use electronic health records (EHRs) to measure the quality of the care delivered by each provider in the past 24 hours, and provide feedback the next day
- Conduct rapid-cycle experiments with alternative feedback information for doctors, with an eye toward making feedback reports more actionable at the bedside
- Discover why some sites in multi-site demos are more successful than others by mining a warehouse of claims and provider data

Why Is It Important? Examples in Health (2)

- Forecast a state's Medicaid budget a year in the future by predicting the service use of beneficiaries and combining with program coverage and benefit rules
- Improve patient compliance by combining EHR data with social media and web search data to give patients individualized technical assistance and other behavioral interventions
- Measure the effectiveness of outreach to beneficiaries about a new program, and predict the number who will sign up by analyzing social media and web searches
- Conduct rapid-cycle experiments with alternative approaches to hospital discharge planning to reduce readmissions



Leveraging CMS Data to Accelerate Health System Change

Niall Brennan
Chief Data Officer
Centers for Medicare & Medicaid Services

@N_Brennan

Introduction

- CMS is the largest single payer for health care services in the US
  - Expected to serve over **123 million individuals** in 2016 between the:
    - Medicare program (health insurance for individuals age 65 and older, as well as those with disabilities)
    - Medicaid program (health insurance managed by the states for individuals with lower incomes)
  - Over **11 million plan selections** during the 2015 open enrollment period for the federal and state health insurance marketplaces
  - **2.5 billion claims** submitted annually for the Medicare FFS program alone
- Significant new data sources
  - Meaningful use of health information technology
  - Provider quality information
  - Health Insurance Marketplace data
- Trusted to protect beneficiary privacy

CMS Data and Delivery System Transformation

- CMS data is critical to decision making for the agency and other stakeholders in the health care system
- The big data revolution has given CMS the capabilities to use and share data in new and innovative ways
- To promote delivery system transformation, CMS is:
  - Employing advanced analytics to create actionable information products, accelerate transparency, inform policy decisions and evaluate programs
  - Routinely and safely sharing data with numerous stakeholders to drive health care quality and efficiency improvements and lower health care costs
  - Driving unprecedented efforts around health data transparency

Variation in Prevalence and Spending for Beneficiaries with Multiple Chronic Conditions

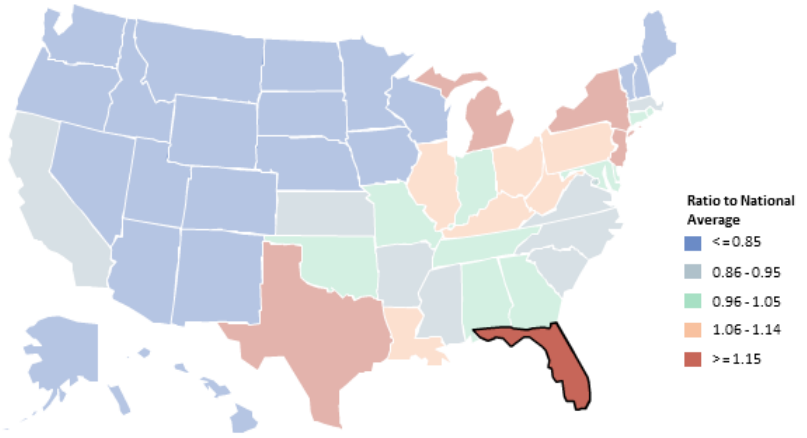
Medicare Chronic Conditions Dashboard: County Level

Medicare Spending & Utilization by Number of Chronic Conditions, 2012

Prevalence | Spending and Utilization | User Info

Number of Chronic Conditions (6+) Prevalence: State to National Ratio

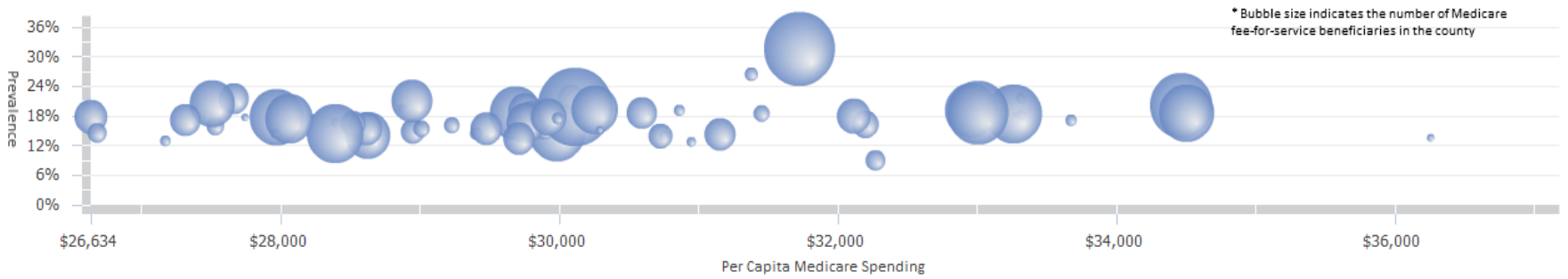
Number of Chronic Conditions: 6+ Help



State	6+ Chronic Condition(s) Prevalence	Per Capita Medicare Spending	ED Visits per 1,000 Beneficiaries	30 Day Readmission Rate
National	14.40%	$30,214	1,976	24.10%
Alabama	14.36%	$29,553	1,961	22.93%
Alaska	7.28%	$25,482	2,249	21.56%
Arizona	10.95%	$29,991	1,943	23.36%
Arkansas	12.62%	$30,205	2,085	24.04%
California	13.45%	$30,501	1,845	24.64%
Colorado	9.11%	$30,142	2,134	21.46%
Connecticut	14.84%	$29,017	2,054	24.06%
Delaware	15.03%	$28,548	1,790	22.99%
District of Columbia	13.28%	$35,318	2,734	31.01%
Florida	18.76%	$30,647	1,688	23.98%
Georgia	13.81%	$30,342	2,165	23.45%
Hawaii	9.57%	$24,087	1,755	22.30%
Idaho	9.11%	$27,414	1,968	19.42%
Illinois	15.31%	$31,577	1,992	25.79%
Indiana	14.94%	$31,277	2,052	23.61%

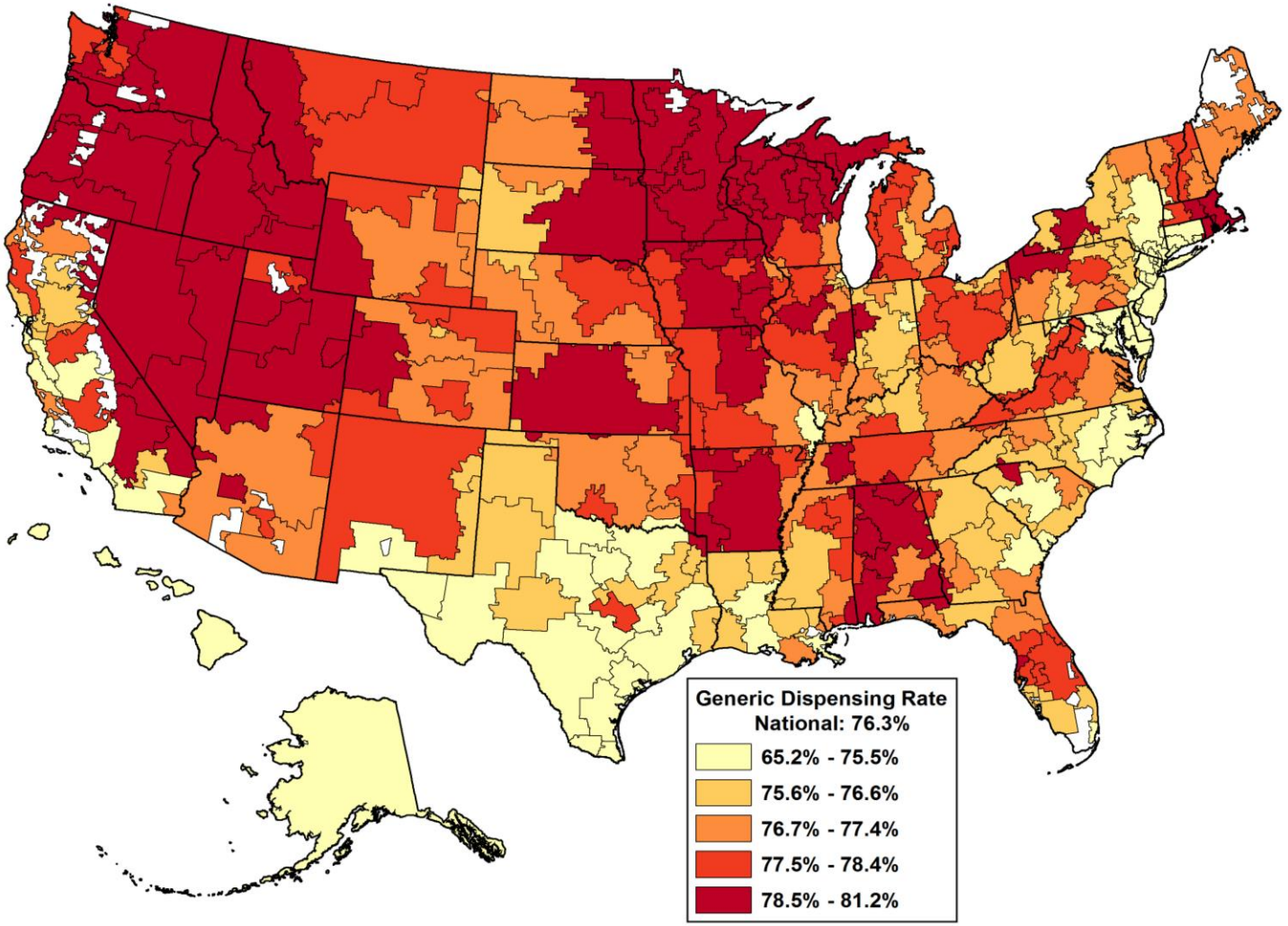
Per Capita Spending | ED Visits | Readmission Rate

Florida: 6+ Chronic Conditions by County Graph

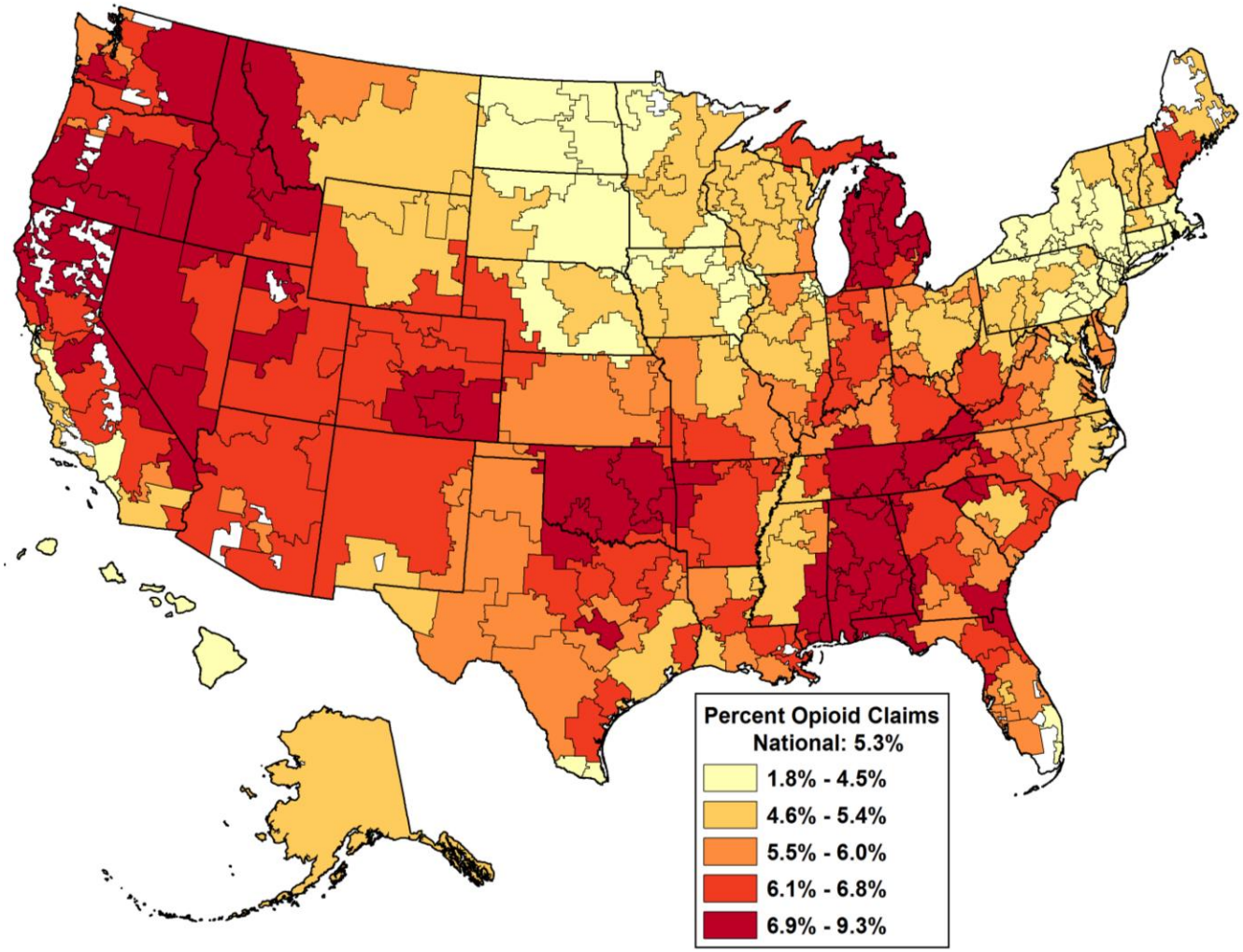


Produced by the CMS/Office of Information Products and Data Analytics (OIPDA), May 2014

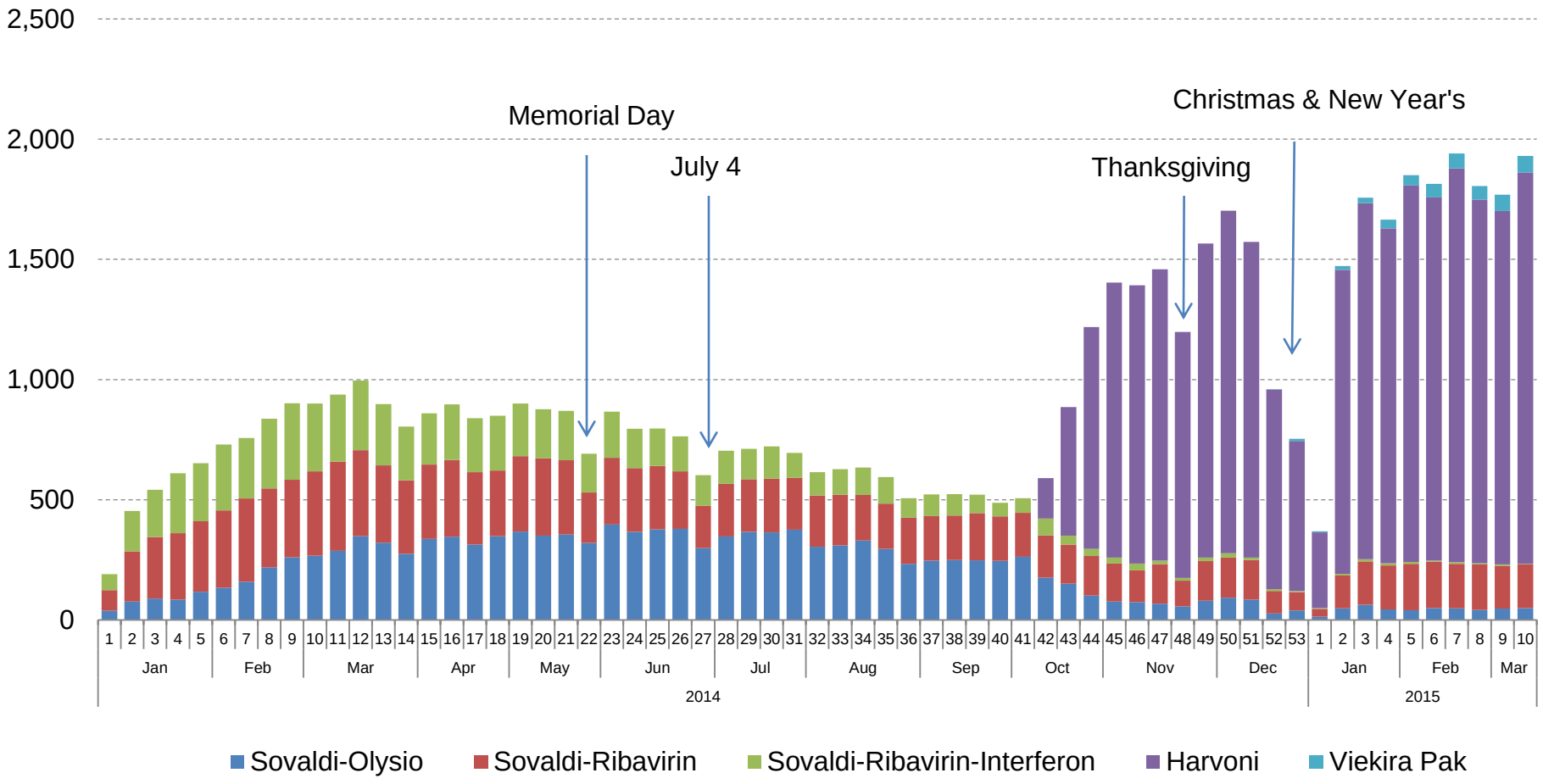
Generic Dispensing Rates by HRR in Part D



Percent of Opioid Claims by HRR in Part D

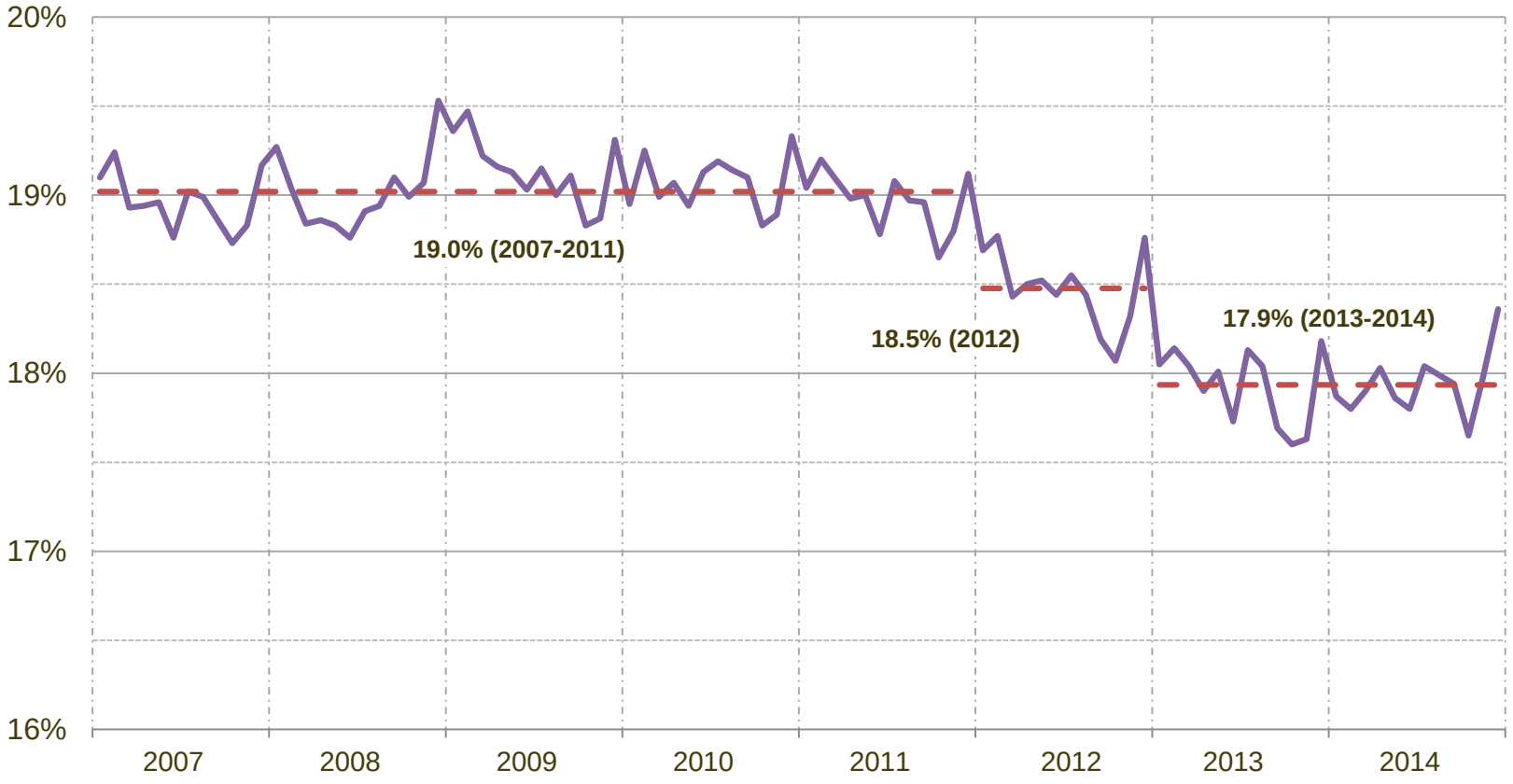


New Hepatitis C Drug Episodes in Part D by Regimen



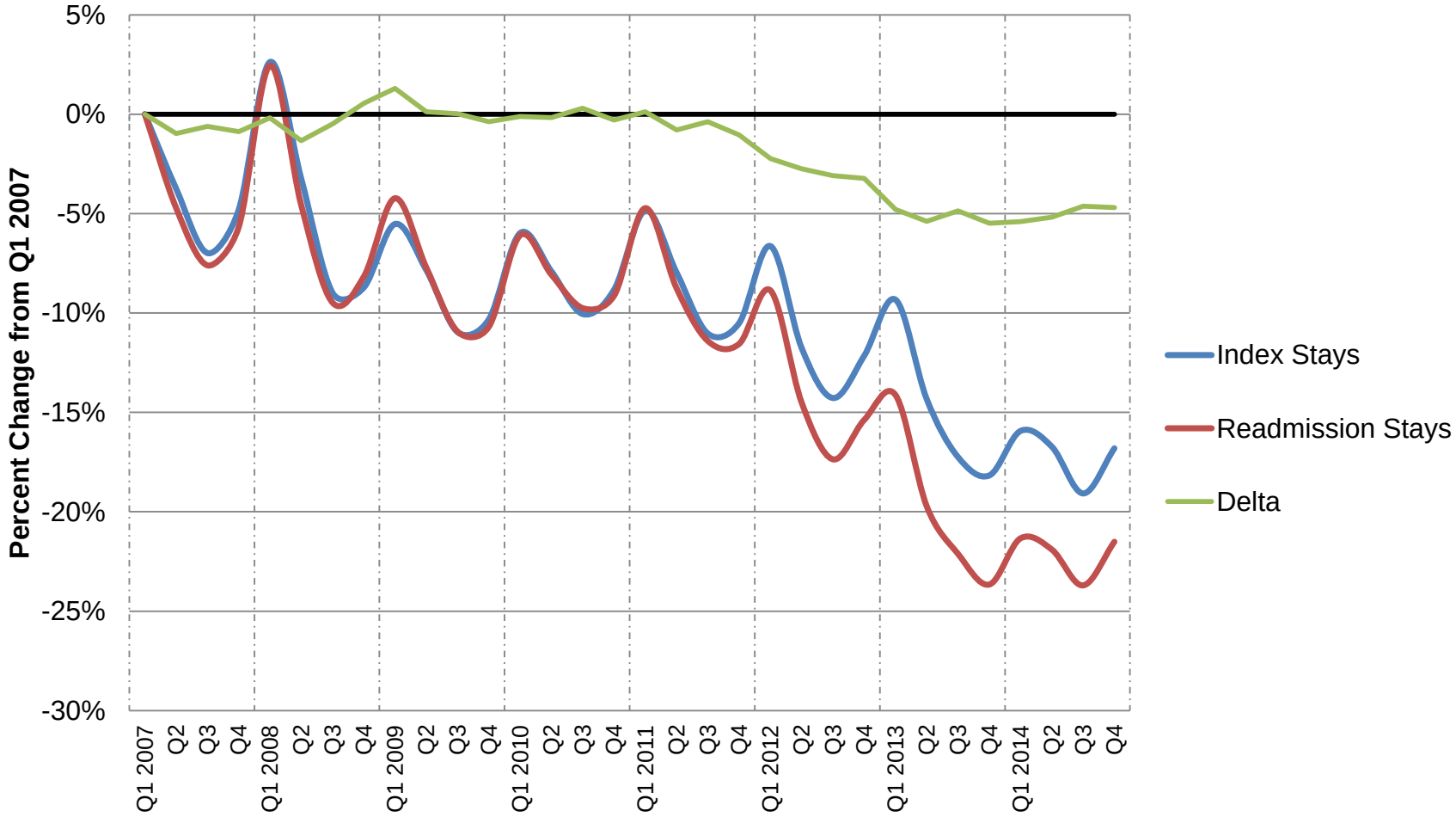
Tracking Medicare FFS Readmissions

Medicare 30-Day, All-Condition Hospital Readmission Rate
January 2007 - December 2014



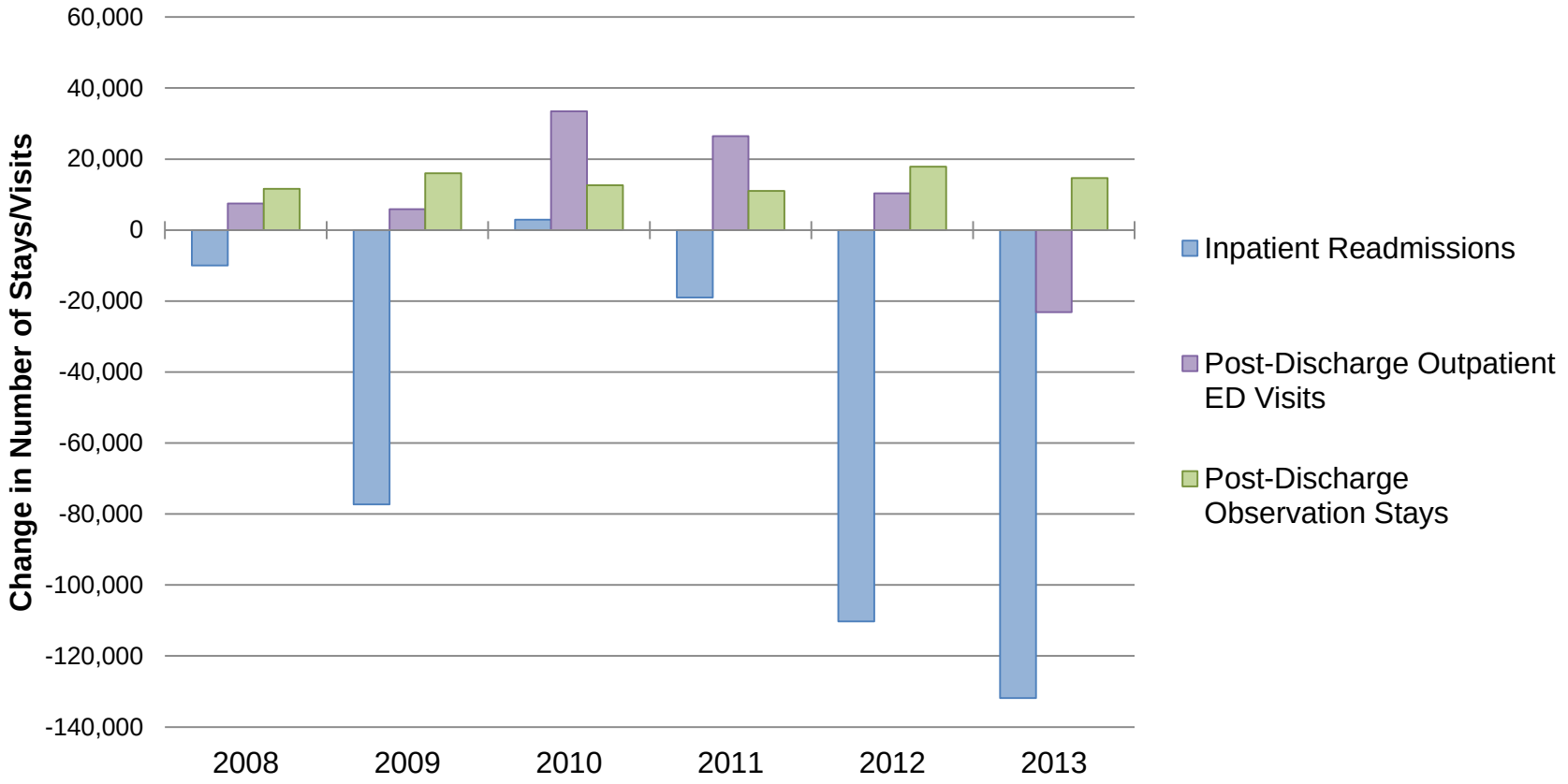
Cumulative % Change in Index Stays and Readmissions

(Q1 2007 = 0)



Annual Change in Hospital Services 30 Days Post Inpatient Discharge

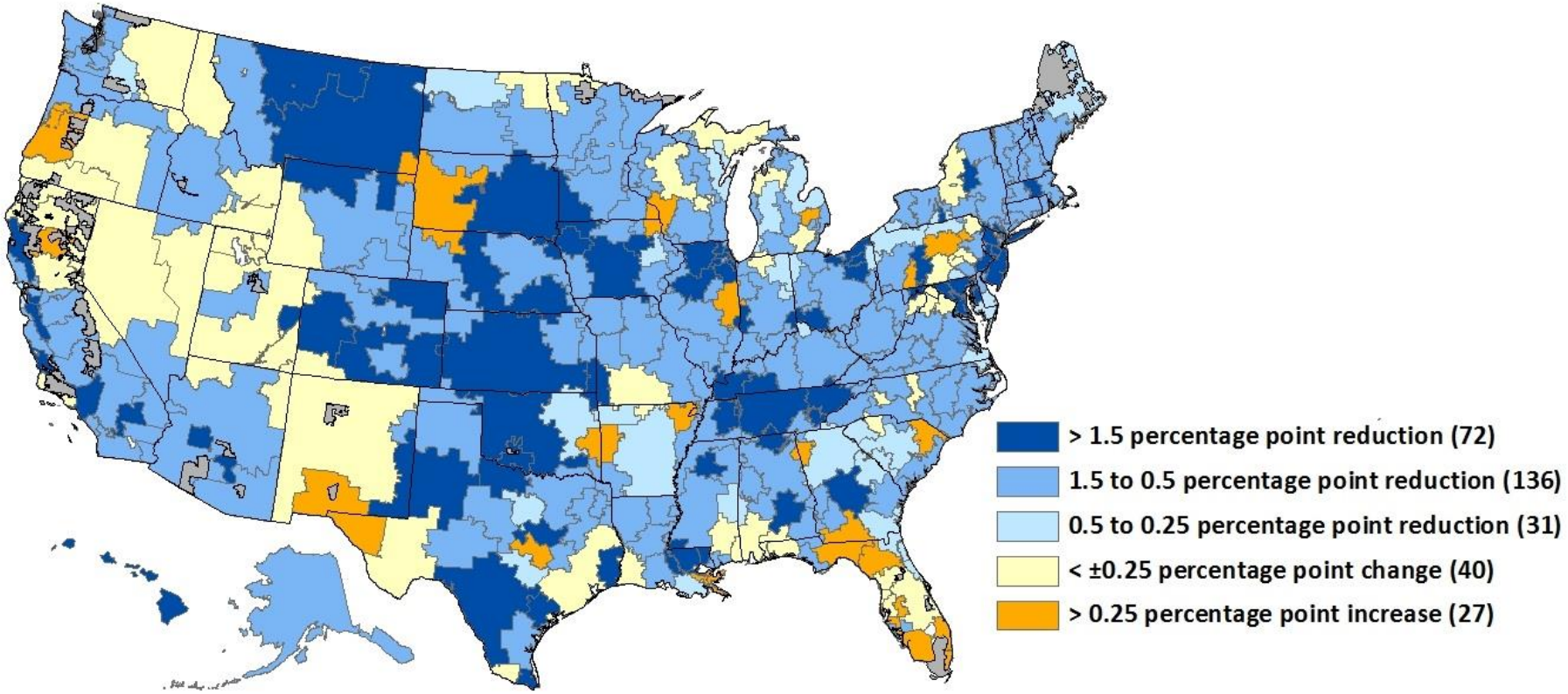
- Hospital outpatient services growing more slowly than readmissions have been declining



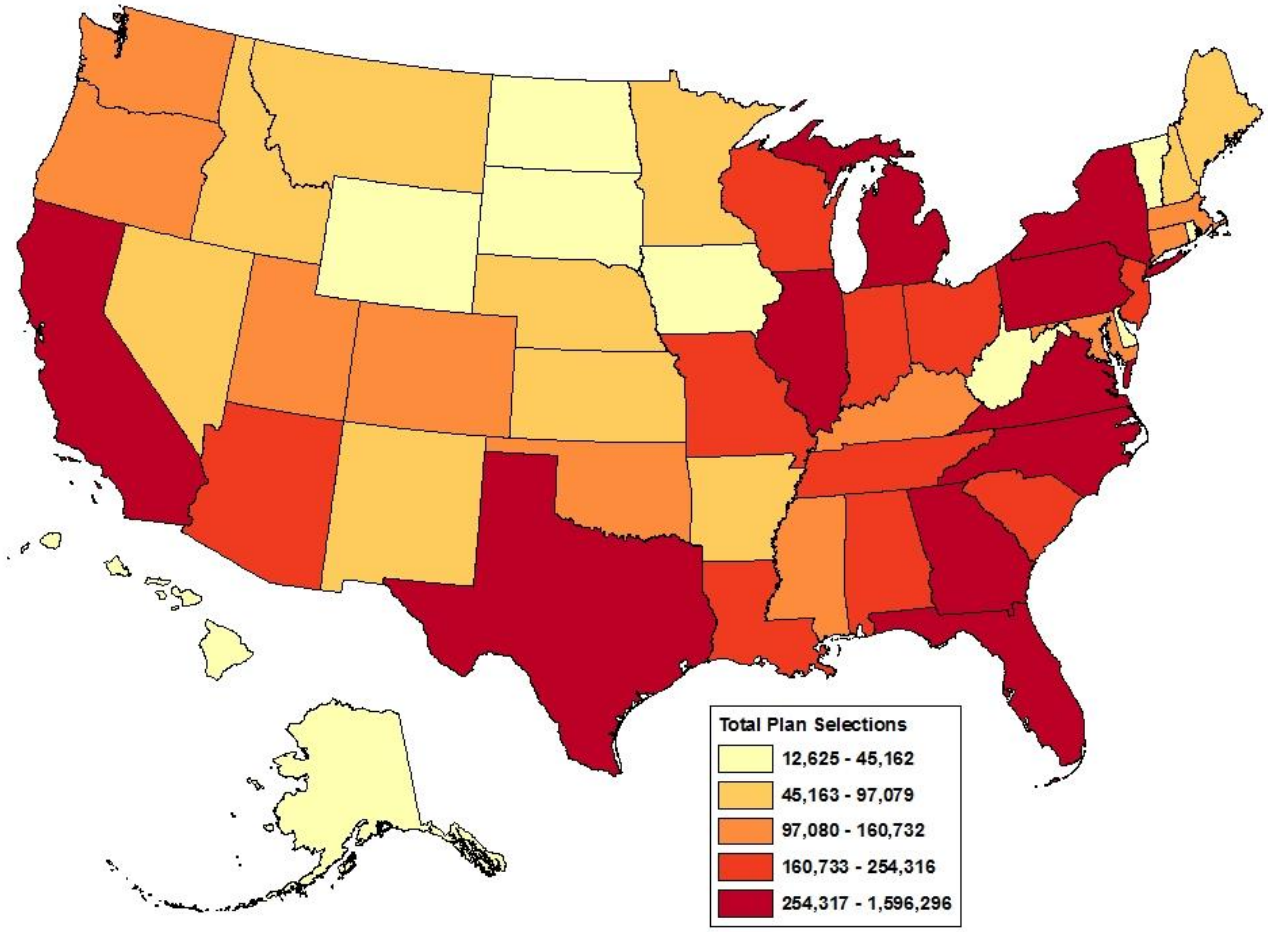
Change in Medicare Readmission Rate

2014 Rates to 2007-2011 Mean, by HRR

Change in national rate = -1.1 percentage point

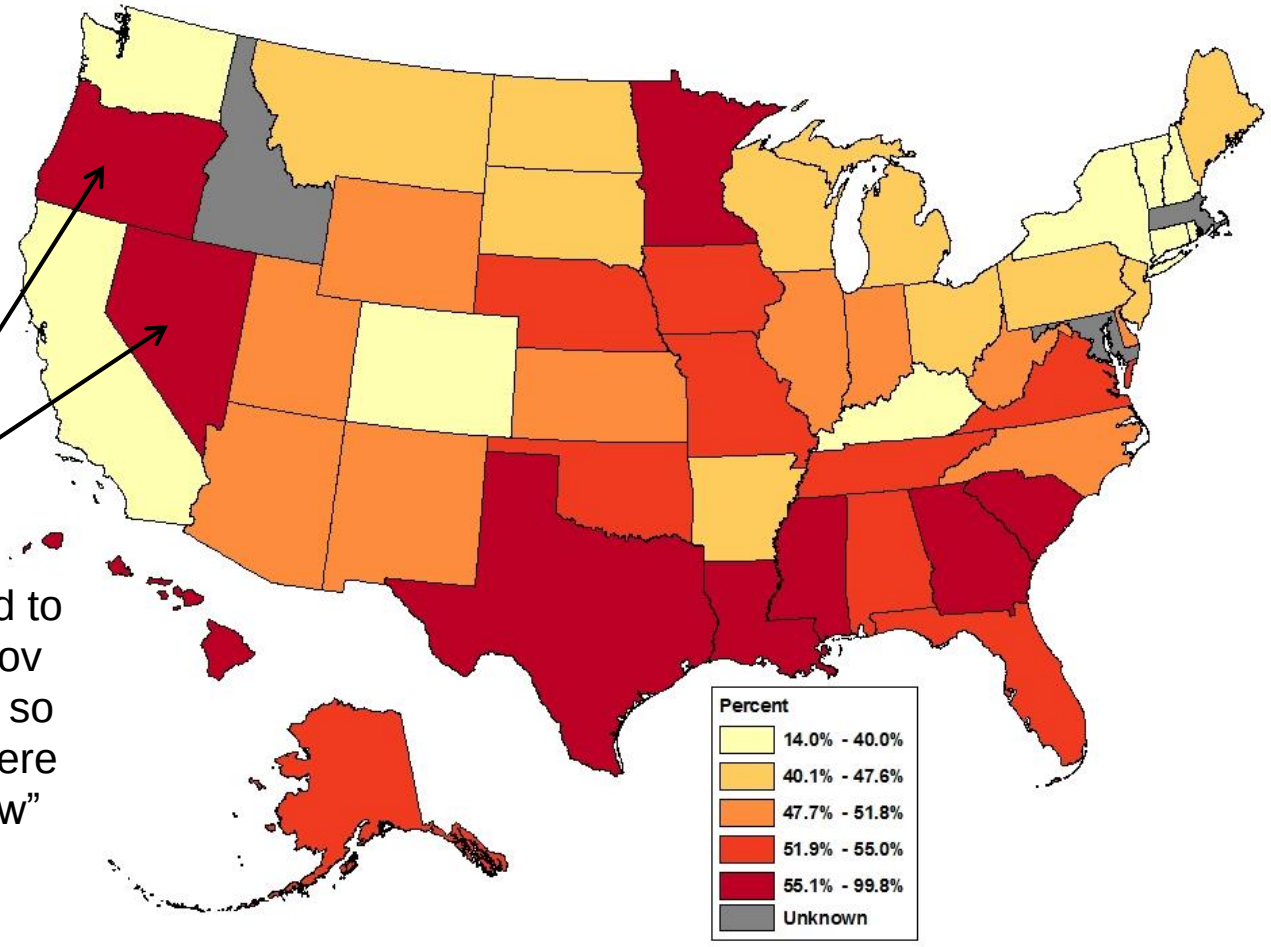


Total Number of Individuals with Plan Selections during 2015 Marketplace Open Enrollment

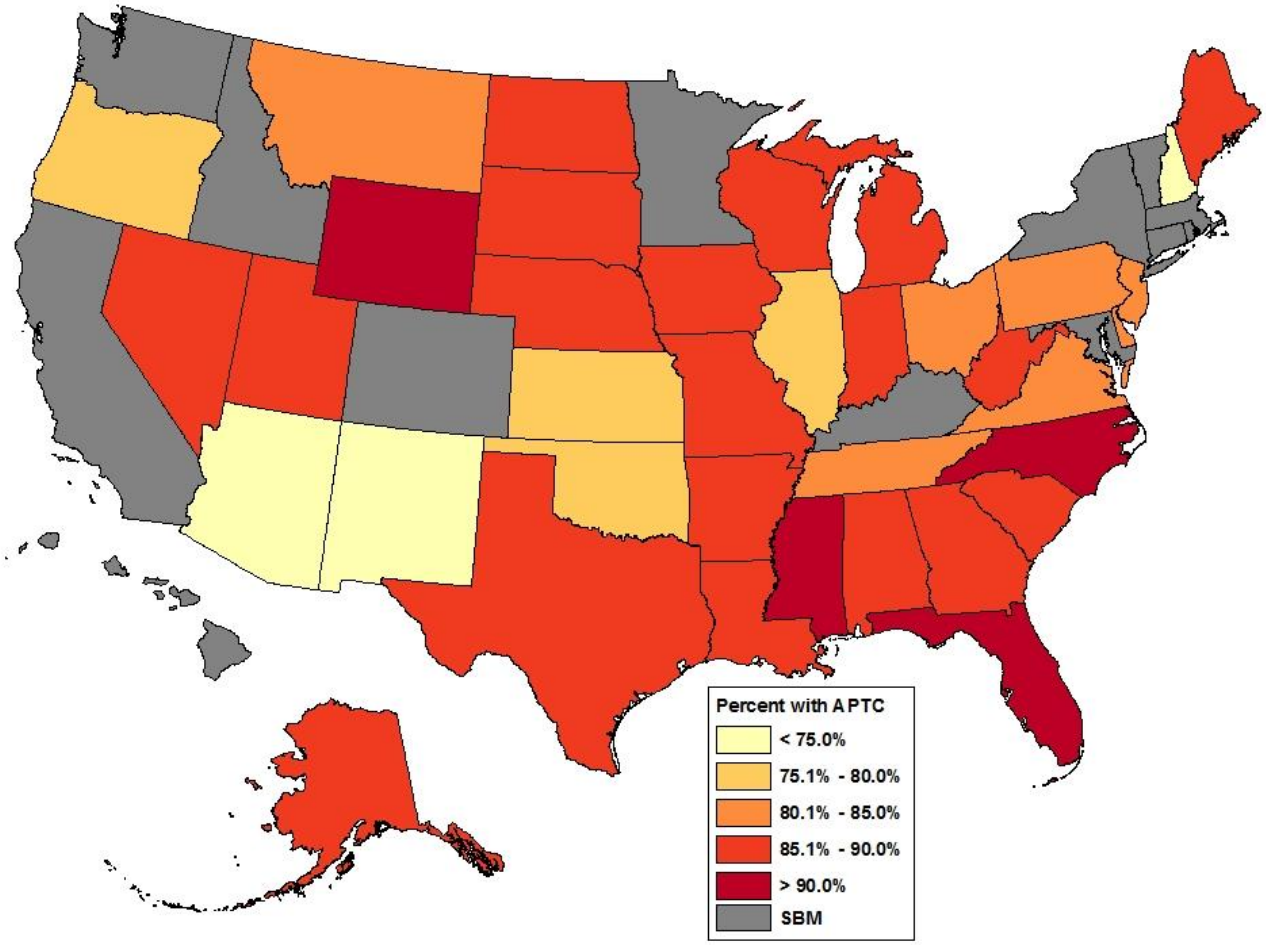


Percent of 2015 Consumers who were New Consumers

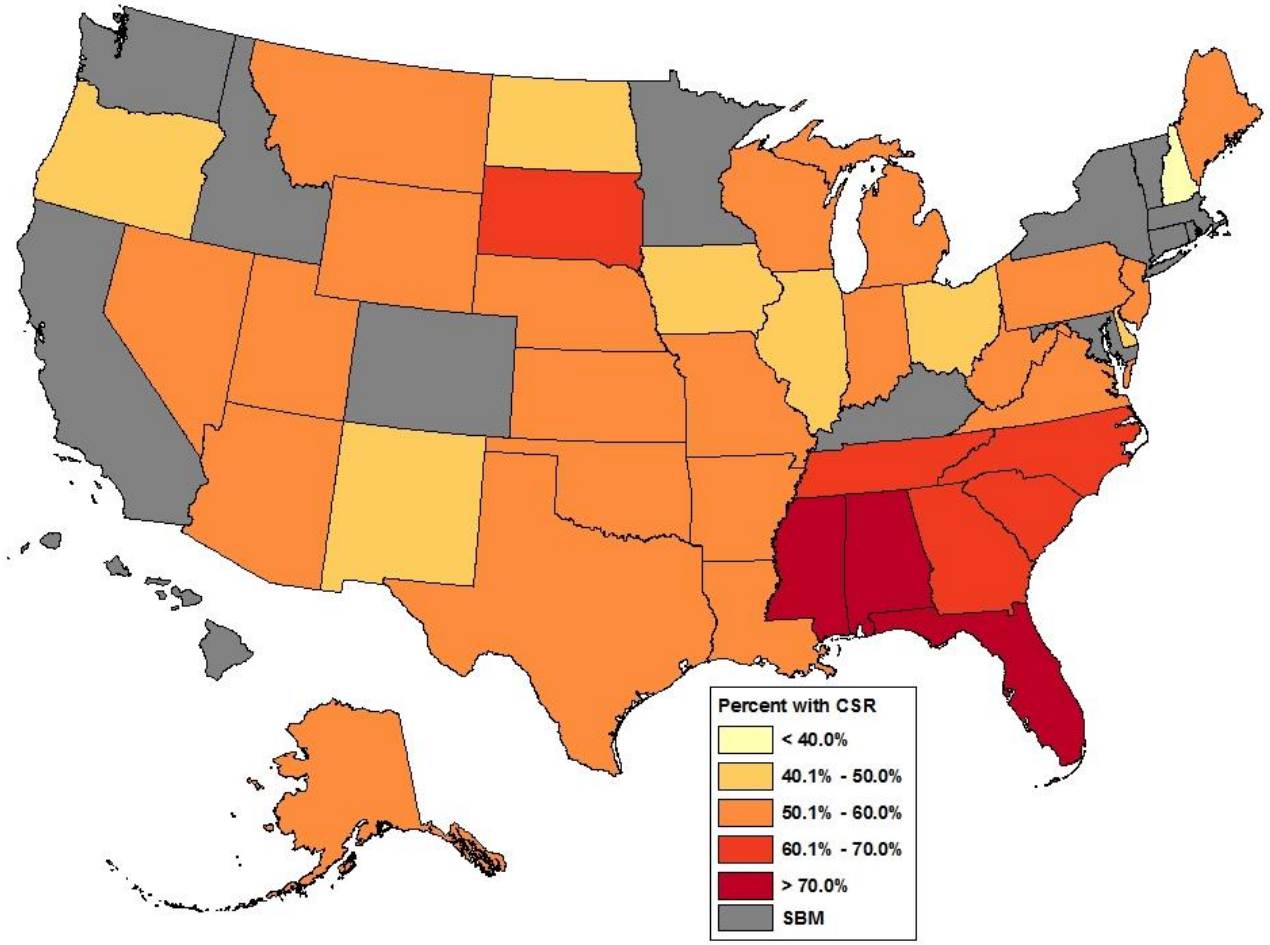
Oregon and Nevada switched to the healthcare.gov platform in 2015 so all consumers were classified as “new”



Percent of 2015 Consumers Receiving Advanced Premium Tax Credit (APTC)



Percent of 2015 Consumers Receiving Cost Sharing Reduction (CSR)



Panel 2: Analytics in Action

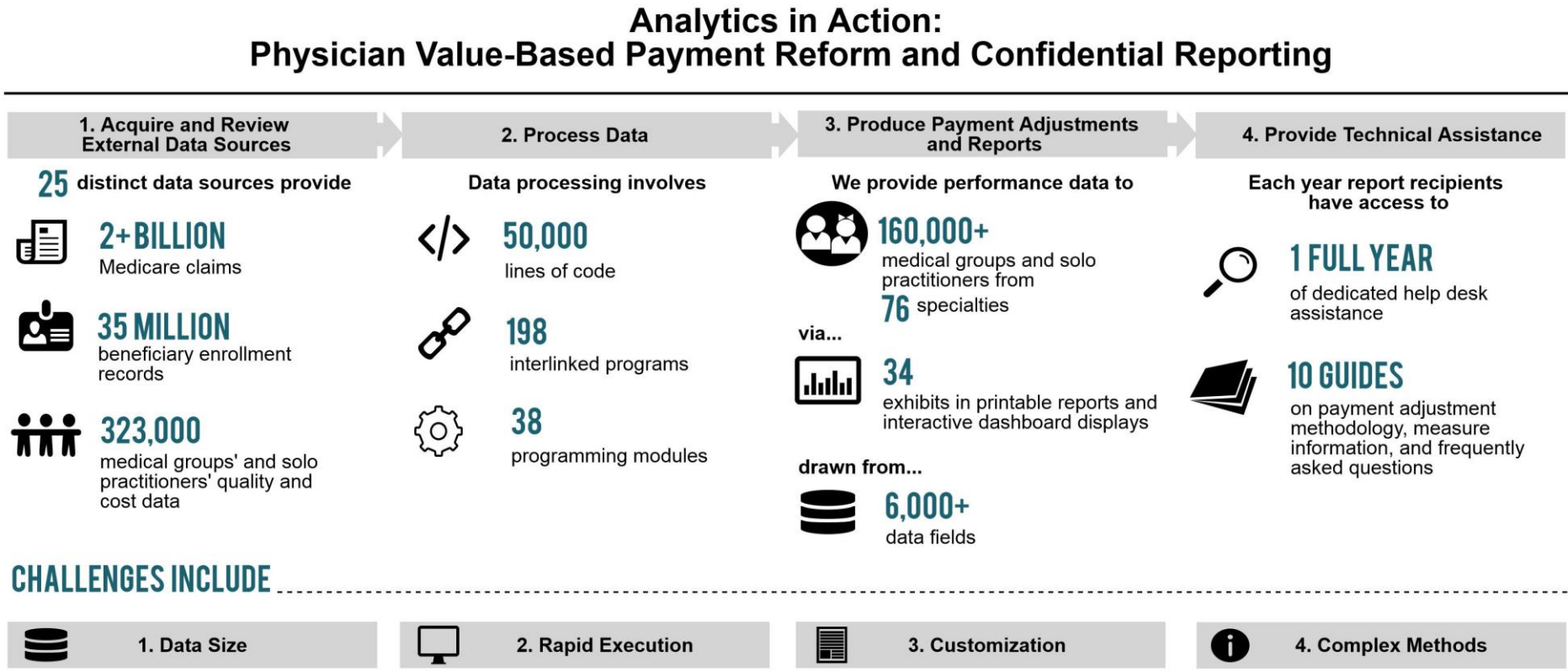
Stuart Buck, Laura and John Arnold Foundation
Moderator

David Weaver, Social Security Administration

Irma Perez-Johnson, Mathematica

Jeffrey Ballou, Mathematica

Analytics in Action



Questions?

Panel 3: The Analytics Frontier

J.B. Wogan,
GOVERNING
Magazine
Moderator

Jennifer Brooks, National Governors Association

Scott Cody, Mathematica

Mark Peterson, USAID

Questions?

For More Information

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- **Ann Person**

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Networking Reception Starts

Now

Mathematica Building Lobby, 12th Floor

4:30–5:30 p.m.