

## **All Payer Claims Databases (APCD) in Data Transparency and Quality Improvement**

Paul LaBrec, 3M Health Information Systems

### **ABSTRACT**

Since Maine established the first All Payer Claims Database (APCD) in 2003, 10 additional states have established APCDs and 30 others are in development or show strong interest establishing APCDs. APCDs are generally mandated by legislation, though voluntary efforts exist. They are administered through various agencies including state health departments or other governmental agencies and private not-for-profit organizations. APCDs receive funding from various sources including legislative appropriations and private foundations. To ensure sustainability APCDs must also consider the sale of data access and reports as a source of revenue.

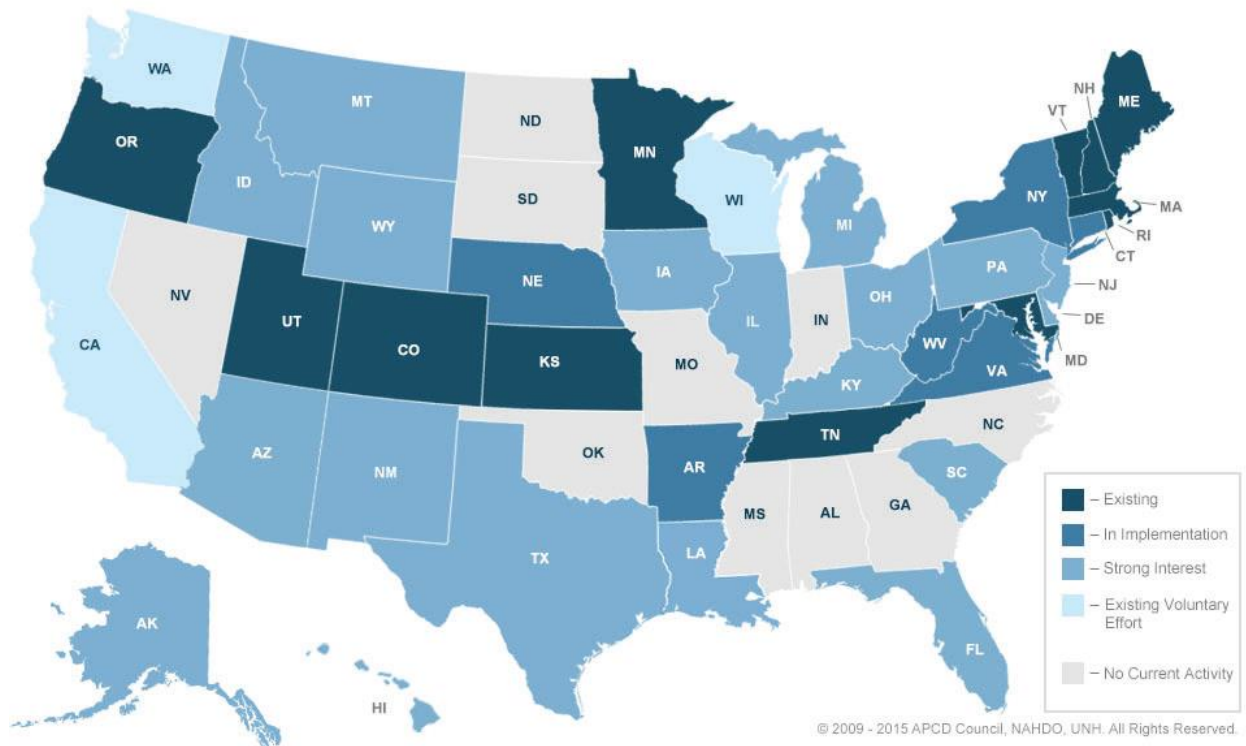
With the advent of the Affordable Care Act there has been an increased interest in APCDs as a data source to aid in health care reform. The call for greater transparency in health care pricing and quality, development of Patient-Centered Medical Homes (PCMH) and Accountable Care Organizations (ACO), expansion of state Medicaid programs, and establishment of health insurance and health information exchanges have increased the demand for the type of administrative claims data contained in an APCD.

Data collection, management, analysis, and reporting issues will be examined with examples from implementations of live APCDs. Developing data intake, processing, warehousing, and reporting standards will be discussed in light of achieving the triple aim of improving the individual experience of care; improving the health of populations; and reducing the per capita costs of care. APCDs will be compared and contrasted with other sources of state-level health care data including hospital discharge databases, state departments of insurance records, and institutional and consumer surveys, and the benefits and limitations of administrative claims data will be reviewed.

Specific issues addressed with examples include implementing transparent reporting of service prices and provider quality, maintaining master patient and provider identifiers, validating APCD data and comparison with other state health care data available to researchers and consumers, defining data suppression rules to ensure patient confidentiality and HIPAA-compliant data release and reporting, and serving multiple end users including policy makers, researchers, and consumers with appropriately consumable information.

### **INTRODUCTION**

An All Payer Claims Database (APCD) can simply be described as a statewide aggregation of health care claims and administrative data (Porter et al, 2015). Furthermore, APCDs are electronic databases designed to support analysis and reporting of health care data for multiple purposes to multiple audiences. Since 2003 11 APCDs have become operational, about a half-dozen others are presently in implementation, and over a dozen have expressed strong interest in developing APCDs (Figure 1). In this review, I will present a general description of APCDs, provide specific examples of data and reporting from APCDs presently on-line in Massachusetts, Maine, and Colorado, using examples from these sources and others to discuss the issues of health care data transparency and quality assessment.



**Figure 1 - APCD Development Efforts by State – February, 2105**

After reading this paper you will have a fundamental understanding of administrative health care claims data and APCDs, exposure to a sample of reporting available in and analyses possible using APCD data. You will also understand the necessity of risk adjustment in comparing populations and providers of health services. Finally, you will understand the concepts of transparency and quality in health care today and the role of the APCD in advancing those concepts.

## APCD OVERVIEW

Most All Payer Claims Databases (APCD) are authorized by state legislative statutes or created as voluntary reporting efforts. APCDs may be administered directly by state agencies or by non-governmental non-profit agencies. Existing oversight models include Departments of Health (Utah, Minnesota), Independent state agencies (Maine), Health and Insurance Departments with overlapping responsibilities (New Hampshire), and independent, non-partisan, non-profit organizations (Colorado, Virginia) (Porter et al, 2015).

Specific data elements contained in APCDs vary from state to state and may include information about health care utilization, quality and cost of services, financing at facility and state levels, disease incidence and prevalence, population health, and risk-adjusted comparisons of patients and providers. Consumers of data and reporting from APCDs include legislators and policy makers, academic researchers, health care providers and payers, pharmaceutical and medical device manufacturers, public health personnel, and the health care consumer—the current or potential patient encountering the health care system.

An APCD generally carries as part of its charter the direction to provide some readily available information at no charge to the public. This information will generally include both quality data (e.g., hospital safety measures, patient-reported hospital ratings, etc.) and health care cost data (comparative pricing for elective procedures, variation in health care insurance premiums, etc.). In addition to providing free data and reports, most APCDs also provide more detailed data and reporting for a fee. Providing these products and services is part of the sustaining revenue model for some APCDs. Obtaining the detailed data available for purchase from an APCD requires at least a signed Data Use Agreement (DUA)

stipulating how the data will be used (and not used) and may require a formal application for use to a Data Review Committee (DRC) comprised of various stakeholders with an interest in a state's use of personal health information.

An important caveat to the “All” in All Payer Claims Database is that no database truly has 100% of health care claims. Generally, data from out-of-state insurers who may cover residents in another state do not provide their claims to the APCD where a patient lives. Small employers or self-insured employers may not provide claims. APCDs may not have Medicare data, as those claims are administered directly by the Centers for Medicare and Medicaid Services (CMS) (fee-for-service claims) or by an insurer providing a Medicare managed care program. States can request Medicare data for inclusion in their APCD through an application and review process with CMS.

Because much of the data fueling APCDs is derived from administrative health care claims, a more detailed discussion of claims data is appropriate to a better understanding of APCDs.

## **HEALTH CARE CLAIMS DATA**

Health care administrative claims records are generated to facilitate the process of payment (to providers) or reimbursement (to consumers) for billable events. For that reason administrative claims data include information about billable modes of care such as office visits, hospital inpatient stays, laboratory or radiology tests, or filled prescriptions. In general, administrative claims data do not have information about the results of laboratory or radiology tests ordered, physical measures such as height, weight, and body mass index (BMI), behavioral history such as smoking or exercise habits. Claims will include data such as the date and location of service, type of facility, provider type, diagnosis and procedure codes, and financial information about the claim, including billed and allowed charges. Claims are generally organized by type as inpatient, outpatient, provider, and pharmacy. In addition, claims reflecting healthcare utilization are linked to eligibility records maintained by the insurer which contain person-level attributes of those to whom the insurer is providing coverage. Eligibility data include demographics (age and sex), plan type (HMO, PPO, POS, etc.), ZIP Code of residence, and other information. Much of this information is standardized as most data intake forms are based on either a common inpatient (UB 04) or outpatient (CMS 1500) claim form, common taxonomies are used for classification of diseases and procedures (International Classification of Diseases, Ninth Revision or ICD-9), common hospital codes such as those assigned by the CMS, and common coding for pharmaceutical products (National Drug Code or NDC).

In spite of all that standardization, however, resolving data issues is a non-trivial part of developing and maintaining a ‘clean’ health care claims database. Errors in data submissions must be rooted out and resolved, eligibility records verified, duplicate records identified, and multiple nonstandard identifiers referring to identical persons or entities matched. For example, a single physician may deliver care in multiple office locations using multiple tax identification numbers (TIN), or multiple physicians may bill for services under the same TIN using a common billing address, not located where services were delivered.

After administrative claims are generated for health service they usually enter into an adjudication process between the provider submitting the claim, the insurer paying the claim, and the patient (or other insured person) who may also pay some or all of the claim. This adjudication process generally takes up to 90 days until the final payment amount for services is determined.

Claim information is held in large databases by the insurers who pay for the care. In addition, health care providers such as hospitals, physician practices, and pharmacies also maintain data on patient encounters and financial accounts. These data may reside in electronic health records (EHR), billing databases, or even partially in paper files. Most health care organization, even of modest size, will perform or contract for some level of analytic services using their administrative claims data.

As anyone who has had a non-trivial encounter with the health care system can attest, a patient often receives multiple bills related to a single ‘event.’ For example, if I injure my knee while playing a pick-up game of basketball, I may take a trip to urgent care, which would generate at least one facility claim for services (possibly a separate provider bill), and perhaps a pharmacy bill for pain medication. If the injury doesn’t improve in short order, I may follow the urgent care visit with one to an orthopedic specialist who conducts a physical exam and orders an x-ray—resulting in probably at least two additional claims. At a

follow-up exam with the orthopedist we may agree to move ahead with elective surgery. If the procedure isn't too complex or debilitating, I'd probably have outpatient surgery involving an ambulatory surgery center, surgeon, and anesthesiologist, each of whom generates a claim(s). After more pain meds and recovery, I would likely be sent for physical therapy, which also will generate a claim(s). With some health plan-provider relationships some or all of these claims may be 'bundled' in an episode of care, reducing the individual claims. An episode may cover a surgical pre-operative exam, surgery, post-operative exams, and physical therapy when all are related to the same incident.

## **TRANSPARENCY AND QUALITY IN HEALTH CARE**

### **REVIEW OF TRADITIONAL FEE-FOR-SERVICE MEDICINE AND "OPAQUE HEALTH CARE"**

The concepts of transparency and quality or value measurement in health care today are best understood by first reviewing the problems with the US health care system that helped provide motivation for these movements. The system that has been undergoing reform could be characterized as one dominated by fee-for-service (FFS) medicine and "opaque health care."

In a FFS model, payers reimburse for all services, regardless of their impact on patient health. Little or no countervailing pressure to discourage the delivery of unnecessary services exists in this system. While most patients are shielded from the direct cost of care by insurance, the fear of lawsuits ("defensive medicine") encourages doctors to order any and all tests (Barnes, 2012).

Whether as per capita spending or as percentage of GDP spent on health care, the United States spends more on health care than any other country. On most measures of health services use, however, the United States is below the level of other developed countries (Anderson et al, 2003). Some have pointed to high input costs, including doctors' and nurses' salaries, drugs, and other medical supplies, and the profits of private participants in the system, as accounting for the largest portion of nearly half a trillion dollars in additional annual spending on the part of the United States compared to other Organisation for Economic Co-operation and Development (OECD) countries (McKinsey Global Institute, 2007). The Health Care Cost Institute (HCCI) recently analyzed health care spending data from claims among persons under age 65 covered under employer sponsored health insurance (ESI) from 2010-2011 and concluded that prices primarily drove health care cost increases during that period. Declining utilization in 2013, however, offset price increases, keeping expenditure growth historically slow (Health Care Cost Institute, October 2014).

Price transparency is common in other industries but rare in health care, where "charges," "prices," "rates" and "payments" all have different meanings and bear little relation to "costs" (Beck, 2014). We all know that when we go to a grocery store or a restaurant the prices are posted for all to see and two people purchasing the same product at the same time will pay the same price (coupons or club discounts withstanding). If a night out at a restaurant was billed and reimbursed like an evening at the emergency room, most diners would have no idea what their meal was going to cost, even after they've left the restaurant. They may be charged \$100 for a tin of after dinner mints they could have purchased for a dollar on their way home. A couple of weeks may go by before they start getting bills. When they do they receive one from the restaurant, then another from the chef, then one from the waiter. In the end, they may owe a modest amount, as their employer-sponsored Diner's Club covered the majority of the bill. The neighbor with whom they dined, however, didn't have such a good club deal and is stuck with a \$10,000 dinner bill! Greater transparency in health care costs can reduce that kind of indigestion.

### **TRANSPARENCY**

#### **Context of the Affordable Care Act (ACA)**

The growing movement toward health care transparency in the past few years has taken place in the context of the move of the US healthcare system from a predominantly fee-for-service delivery and payment model to a more population health and value-based model. Many of these developments are taking place in the regulatory environment of the Patient Protection and Accountable Care Act (PPACA) signed into law in 2010 (HHS) (USDHHS, 2014b). Features of the US healthcare system developing from this legislation include Accountable Care Organizations (ACOs) and Patient Centered Medical Homes (PCMH), and the new Health Insurance Exchanges. In each of those environments, a good

understanding of population health status, health service utilization, and health provider quality and value is critical for program success (Hammond, 2011; Fillmore et al, 2013).

Prior to the advent of the PPACA, Don Berwick of the Institute for Healthcare Improvement (IHI) summarized this new population health, value-based emphasis in what he calls the “Triple Aim” (Berwick, 2008).

- Improving the patient experience of care (including quality and satisfaction)
- Improving the health of populations
- Reducing the per capita cost of healthcare

Both quality and transparency are core to the triple aim.

The rationale for bringing more transparency into the health care marketplace is that more open sharing of information between payers, providers, governments and consumers will help both to decrease costs and increase quality of care. If consumers are able to see more price information concerning services they plan to purchase (or may need to purchase), and are also able to obtain greater information on the quality of various services from which they may choose, they will bring market pressure to bear on the health care system to provide better quality services at lower prices. Particularly as consumers are paying an ever-increasing share of health care costs, through higher premiums, deductibles, co-insurance and co-pays, their out-of-pocket costs continue to increase. In order to be more informed consumers, however, the public needs access to the right information to make health care decisions.

Providers of health services also require information to optimize their care patterns, use of resources, and competitive positions in the marketplace. The right information obtained in a timely manner can help providers identify cost-effective patterns of care, avoid practices that compromise quality, and deliver the best possible care to their patients.

Employers can use healthcare pricing and utilization data to design optimal employee benefits packages and wellness programs. Government agencies providing public insurance coverage can use quality and pricing information to structure better contracts and provider networks.

## **QUALITY**

In a series of landmark works on quality in the US health care system, the Institute of Medicine defined quality as

The degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge. (Lohr, 1990)

According to the Health Resources and Services Administration (HRSA) of the US Department of Health and Human Services a quality metric “allows a user to quantify the quality of a selected aspect of care by comparing it to a criterion” (HRSA, 2015). There are several different types of quality metrics:

- Access measure - assesses the patient's ability to obtain timely and appropriate health care.
- Outcome measure - is the patient's health status after receiving health care services. It can be used to evaluate the quality of care to the extent that health care services influence the likelihood of desired health outcomes.
- Patient experience measure - aggregates reports of patients about their observations of and participation in health care.
- Process measure - assesses the actual health care service provided to, or on behalf of, a patient.

- Structure measure - describes a feature of a health care organization or clinician relevant to its capacity to provide health care (e.g., nurse to patient ratio, number of beds).

Each of these has strengths and weaknesses in an overall view of quality measurement. Outcome measures, for example, may provide a more definitive answer to the ultimate success of a quality intervention—did a patient survive at least 5 years after surgery for cancer; did a low-birthweight baby achieve adequate growth status in its first year of life. Outcomes, however, can take a long period of time to develop. For example, let's say you want to measure real differences between two hospitals in the quality of care arising from differential use of a proven intervention for myocardial infarction. And you wanted to do this analysis by comparing mortality rates due to MI between the two hospitals. In order to assess that outcome, you would need to follow over 3,600 patients in each hospital in order to detect a 10% difference in mortality rates (with an  $\alpha=0.05$  and 80% power). In a typical UK hospital, you would need 8 years to collect your data. If you measured the uptake of that proven intervention, however, you would only need to follow 48 patients from each hospital and you could complete your data collection in about two months (Mant, 2001).

Process measures, such as cancer screening rates or physician office visits, can generally be collected more easily and readily, but are not necessarily an assurance of quality outcomes. Structural measures, too, are easy to obtain—is there a minimum number of hospital beds available in a community or after hours urgent care—but harder to relate directly to health outcomes.

There are literally thousands of measures of quality applied in the health care industry today. The Agency for Healthcare Research and Quality (AHRQ) lists over 5,000 individual metrics in its National Quality Measures Clearinghouse, covering everything from disease monitoring, evaluation of medication therapies, and occupational health targets (AHRQ, 2015). The National Quality Forum (NQF) likewise has thousands of metrics covering standards including Optimal Diabetes Care and Total Cost of Care (NQF, 2015). The Healthcare Effectiveness Data and Information Set (HEDIS), comprised of over 80 measures, is another ubiquitous set of health care metrics used by over 90% of health plans in the US (NCQA, 2015). Many of these metrics are cross-listed with various standards organizations, and many variants or hybrids of them are in use in the health care industry today.

## PUBLICALLY AVAILABLE APCD DATA

As previously mentioned each APCD will provide some level of information at no cost to the general public. In this section I will review examples of this information from three different APCDs (Massachusetts, Maine, and Colorado) and explore one (Colorado) in greater detail.

### APCD EXAMPLES

**Massachusetts** - The Center for Health Information and Analysis (CHIA) is an independent agency established pursuant to M.G.L. c. 12C and created by Chapter 224 of the Acts of 2012--*An Act Improving the Quality of Health Care and Reducing Costs through Increased Transparency, Efficiency and Innovation*--enacted "to improve health care quality and contain health care costs through transparency, efficiency and innovation." CHIA mission is to serve the Commonwealth of Massachusetts as its primary hub for health care data and a primary source of health care analytics to support policy development. (Center for Health Information and Analysis, 2015).

One of the primary charges of CHIA is to collect data in order to calculate total health care expenditures (THCE). THCE is a measure of total spending for health care in the Commonwealth defined as

[T]he annual per capita sum of all health care expenditures in the Commonwealth from public and private sources, including: (i) all categories of medical expenses and all non-claims related payments to providers, as included in the health status adjusted total medical expenses (TME) reported by the Center; (ii) all patient cost-sharing amounts, such as deductibles and copayments; and (iii) the net cost of private health insurance, or as otherwise defined in regulations promulgated by the Center (CHIA, 2013, p. 2).

Based on the Center's model, THCE for Massachusetts residents in 2011 was about \$48.6 billion (\$7,351 per capita). Expenditures from commercially insured populations accounted for 36% of THCE, while



expenditures from populations covered by public programs accounted for 59%. The net cost of private health insurance accounted for the remaining 5% of THCE. This net cost is “the difference between health premiums earned and benefits incurred” and includes items such as administrative expenses, medical loss ratios, profits or losses (CHIA, 2013, p. 10).

An excerpt of THCS data publically available from the CHIA website is presented in Table 1. These figures are the net costs described above expressed as a Per Member Per Month (PMPM) calculation for payers in the large group fully insured market.

Other data collected and/or presented by CHIA include Medicare Cost Report data, acute care hospital case mix data, hospital charge book data, and relative price data.

Market Segment	Payer	2012 NCPHI PMPM	2013 NCPHI PMPM	% Change NCPHI PMPM
<b>Large Group</b>	Aetna	\$53.07	\$25.92	-51.16%
	BCBS	\$49.12	\$42.22	-14.04%
	CeltiCare	--	--	--
	Cigna	\$51.10	\$37.09	-27.40%
	Fallon	\$41.88	\$25.97	-38.00%
	HPHC	\$61.70	\$62.92	1.98%
	HNE	\$47.91	\$45.22	-5.62%
	NHP	\$106.49	\$81.19	-23.76%
	Tufts	\$70.75	\$74.58	5.41%
	Unicare (Wellpoint)	\$37.79	\$49.40	30.70%
	United	\$44.48	\$1.91	-95.71%
	<b>Group Average (including payers not listed)</b>	<b>\$54.35</b>	<b>\$49.51</b>	<b>-8.91%</b>

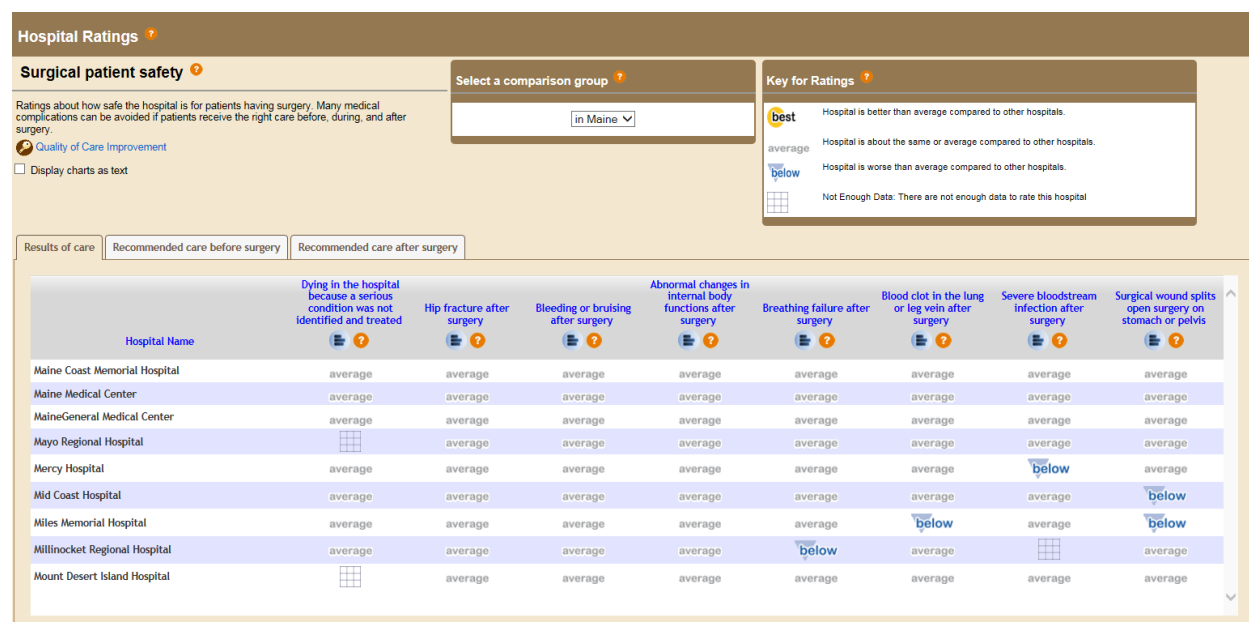
**Table 1 THCE Component: Net Cost of Private Health Insurance PMPM by Market Segment by Payer**  
Source: CHIA, September 2013

**Maine** – The state of Maine was the first to establish an APCD. The Maine Health Data Organization (MHDO) has collected health insurance claims information in its APCD since 2003. The APCD currently holds claims from commercial insurance carriers, third party administrators (TPAs), pharmacy benefit managers (PBMs), dental benefit administrators, MaineCare (Maine Medicaid), and CMS (Medicare) (Maine Health Data Organization, 2015). As is common among APCDs a state statute—Title 22, Chapter 1683--established Maine’s APCD, specifically Rule 90 590 of the Maine Rule Chapters for Independent Agencies (MHDO, 2015).

Data available through MHDO include health care claims from the sources identified above, including all claims paid for Maine residents by insurance companies licensed in Maine; inpatient and outpatient services provided by 39 non-governmental hospitals; quality metrics—related to surgery, discharge follow-up, infection control, incidence of pressure ulcers and falls—from hospitals and ambulatory surgery centers; and hospital financial data (MHDO, 2015).

MHDO provides quality of care information to consumers using a MONAHRQ® website. My Own Network, Powered by AHRQ (MONAHRQ®) is a desktop software tool developed and provided by the Agency for Healthcare Research and Quality (AHRQ) to assist state and local data organizations, hospitals and hospital systems, nursing homes, and health plans to organize and report various health care data related to quality and cost (Agency for Healthcare Research and Quality, 2015).

These quality indicators include selected Patient Safety Indicators (PSI). PSIs are a set of indicators providing information on potential in hospital complications and adverse events following surgeries, procedures, and childbirth. PSIs use data typically found in administrative hospital discharge record to identify potential complications and adverse events that may represent patient safety events (AHRQ, 2015). Figures 2a and 2b present surgical patient safety data publically available on the MHDO website. These metrics are based on PSIs. For example the final column on the right, titled “Surgical wound splits open surgery on stomach or pelvis” uses PSI 24 - Postoperative Wound Dehiscence Rate. You can view individual Maine hospitals rated against other Maine hospitals (Figure 2a) or against a national average (Figure 2b). These figures present a good example of the importance of the comparison group when making inferences about hospital safety. When compared against other Maine hospitals four of the nine hospitals in the report fall below average in at least one indicator. When the same hospitals are compared to national averages for the same indicators, however, although four hospitals again fall below average, four score above average, with one hospital scoring above average in three categories.

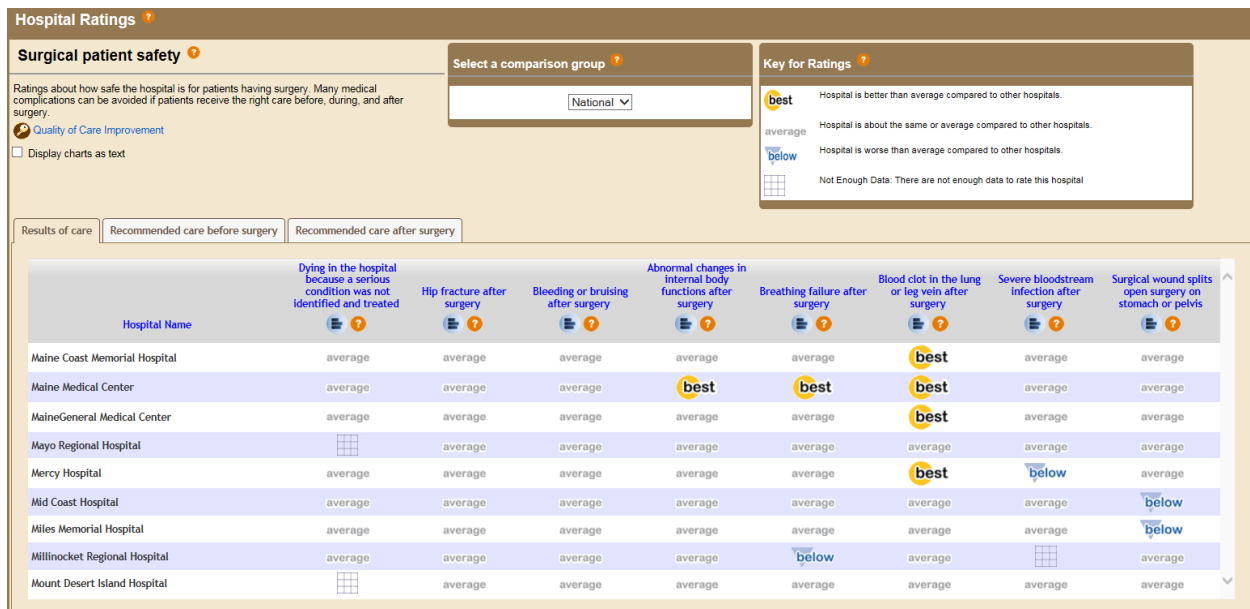


**Figure 2a – Surgical Patient Safety Data Report from Maine Health Data Organization (MHDO) - Hospitals Compared to Maine State Average**  
Source: MHDO, April 2015

## COLORADO APCD DETAIL

The data presented in this section were obtained from the Colorado APCD administered by the not-for-profit Center for Value in Health Care (CIVHC) and downloaded from [www.comedprice.org](http://www.comedprice.org). The CO-APCD is a legislatively mandated database that collects claims information from commercial health insurance companies and public payers including Medicaid. The CO Medical Price Compare tool is maintained by 3M<sup>SM</sup> Health Information Systems and provides more robust data from more payers than any other database or public resource in the state. The database presently includes all of Colorado’s Medicaid claims and much of the commercial (private payer) claims from insurers licensed in Colorado. The CO-APCD is in the process of incorporating Medicare claims data, as well. The database includes inpatient, outpatient, professional, ancillary, and pharmacy claims, along with the associated eligibility data. Small employer plan data, out-of-state insurers are not included, and substance abuse claims (SUD) are scrubbed from the database.





**Figure 2b – Surgical Patient Safety Data Report from Maine Health Data Organization (MHDO) - Hospitals Compared to US National Average**  
Source: MHDO, April 2015

CO-APCD public data delivered through CO Medical Price Compare tool include multiple measures comparing local geographies to each other and to statewide averages. Population-based data summaries are available by county and 3-digit ZIP Code. These tables include Total Cost of Care (TCC), utilization of inpatient and outpatient services, population-based hospital readmission rates, disease incidence and prevalence, population illness burden, potentially preventable readmissions (PPR), and other metrics available for total area populations or by gender and age groups. In addition, facility-specific metrics are available for select quality and price data. Quality metrics include both patient-reported satisfaction with hospital care (Medicare Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey) and state-collected quality data from the Colorado Hospital Report Card (Colorado Hospital Association) and Colorado Department of Public Health and Environment (CIVHC, 2015).

### Population Comparisons and Risk Adjustment

Population comparisons are presented using three calculations—one crude; two risk-adjusted.

**Index** - The Index for a region a comparison of crude event rates (total events per 1,000 patient population) for a local geography versus the state average. The state-wide average is represented by an index of 1.0. An index that is greater than 1.0 indicates the metric is higher for the chosen geography than the state. For example, a geography with an index of 1.11 means that the value for that metric is 11% above the state average.

**Illness Burden** - The Illness Burden for a population is a number used to measure the relative health of that group based upon the number and types of healthcare services used. A higher number (above the 1.0 average) indicates that the population uses more and/or costlier services relative to the rest of the population in the database and is often a result of a higher number of people with chronic diseases like diabetes or asthma. Likewise, smaller numbers (below the 1.0 average), indicate a relatively healthier population using less health care services.

**Compared to Expected** - The 'Compared to Expected' (C2E) values risk adjust for both the disease burden of the local geography—population health—and age/sex variation in the utilization or cost metric being measured. Compared to Expected (C2E) values indicate how different the actual observed data in an area is from an expected value (an average based upon the type of people that live in that area). The C2E is always represented as a percentage. Numbers in red represent those “compared to expected”

values that are in excess of 25%, indicating a higher than average expected cost or use of services. Likewise, numbers in green represent those “compared to expected” values that are below -25% indicating a lower than average expected cost or use of services.

In the Colorado APCD data, population health risk adjustment is accomplished by grouping the data using 3M Clinical Risk Groups (CRG<sup>SM</sup>).

Clinical Risk Groups are a clinical model in which each individual is assigned to a single mutually exclusive risk group which relates the historical clinical and demographic characteristics of the individual to the amount and type of healthcare resources that individual will consume in the future. Since the CRGs are clinically based, they create a language that links the clinical and financial aspects of care (Averill, et al 1999).

Table 2 presents the distribution of risk groups for a sample of Colorado counties. These groups are Aggregated CRGs (ACRGs)—groups of CRGs into which the APCD population is classified. Using this table you can conclude that Archuleta County (with 49% of persons classified as “Healthy” and only 12% classified as “Chronic” or “Critical”) has a lower illness burden than Arapahoe County (with 41% of persons classified as “Healthy” and 16% classified as “Chronic” or “Critical”).

County	Non User Population	Healthy Population	Stable Population	At Risk Population	Simple Chronic Population	Complex Chronic Population	Critical Population
Adams	27%	44%	5%	9%	9%	5%	0%
Alamosa	22%	47%	7%	9%	10%	6%	0%
Arapahoe	28%	41%	5%	11%	10%	5%	1%
Archuleta	24%	49%	7%	8%	8%	3%	1%
Baca	24%	45%	5%	11%	9%	4%	1%

**Table 2 – Illness Burden Measures for a Sample of Colorado Counties**

**Data Source:** [www.comedprice.org](http://www.comedprice.org) (Illness Burden Report). CIVHC, 2015

This assessment is corroborated by data from APCD utilization tables using both a crude comparison (Index) and risk-adjusted comparison (Compared to Expected). The crude hospital inpatient utilization rate is lower than the state average in Archuleta County and higher than the average in Arapahoe Table 3). Likewise the risk-adjusted hospitalization rate is also lower for Archuleta then for Arapahoe. You can see the effect of risk adjustment in these numbers. For example, the crude rate (Index) of hospital utilization in Alamosa County is 41% above the state average; the risk-adjusted rate is only 11% above. When data from Arapahoe County are risk-adjusted the hospital utilization rate is the same as the state average for persons of the same risk profile.

County	Hospital Index	Hospital C2E
Adams	1.30	12%
Alamosa	1.41	11%
Arapahoe	1.02	0%
Archuleta	0.82	-12%
Baca	2.57	80%

**Table 3 – Comparative Utilization Measures for a Sample of Colorado Counties**

**Data Source:** [www.comedprice.org](http://www.comedprice.org) (Utilization Comparison Report). CIVHC, 2015

*Where should I get my knee operation?* – One of the most beneficial tools for health care consumers available through many APCDs is the ability to do some ‘pre-operative shopping’ prior to an elective surgery. Through the consumer interface to an APCD a soon-to-be patient can compare hospitals and sometimes providers along dimensions of both quality and cost. Let’s pickup my illustration from an earlier section. I’m the guy who injured my knee in a pick-up basketball game. After a trip to urgent care, the pharmacy and the orthopedist, I receive the news that my knee is shot and I really should have a knee replacement. Let’s further imagine I live in Denver, CO and a coworker tells me about the CO Medical Price Compare tool. I check it out after I hobble home from work and see that a knee replacement is one of the procedures on which I can compare hospitals on both quality and cost. My orthopedist recommended Denver Health as a location for my surgery and it’s not too far from my home. A friend of mine, however, said he had a similar surgery at Poudre Valley Hospital and he was very satisfied with the results. I peruse [www.comedprice.org](http://www.comedprice.org) and find reports on hospital quality and patient-reported satisfaction with their hospital care. I also see that I can compare average costs for the procedure for someone who has private insurance like myself. When I realize I can download this information the data geek in me gets excited and I fire up my SAS® box. I see I can find an “estimated price,” as well as reports on “hospital quality” and “patient perspective,” which I see are from both state and national sources. I combine the price and quality data in SAS® and select the indicators that are important to me. I choose the estimated price (and range of prices), the average complexity of the cases seen by each hospital, the hospital’s quality rating on occurrence of post-surgical infections, the percent of patients using that hospital who would “definitely recommend it” or rate it “9 or 10 out of 10,” the percent who said that staff “always explained medications,” and the percent who said the “doctor communicated well.” I added all these percentages together to get an aggregated quality score for each hospital, then ranked the hospitals in descending order of that score. When I print my results I see that my doctor’s recommendation, Denver Health, was near the bottom of the list in quality ratings. Although generally more complex cases were treated there, it was also one of the least expensive. My coworker’s recommendation was at the top of the list with high quality and satisfaction ratings, seeing patients of generally average complexity (like myself). It was, however, above average in cost. I know that I’ll be splitting that cost in some way with my insurance company, so I use the calculator tool to enter deductible and co-insurance amounts to get a better idea of what I may actually pay. I came away learning a few things and having more information than I had previously to make my surgery decisions.

The CO-APCD data also allow comparison of costs accounting for both average complexity of cases and insurance payer type. Figure 3 below presents a column graph comparing the median cost of the same knee replacement by payer type and complexity. The number of cases is higher than represented in Table 4 because not all the facilities had the quality data that were summarized in that table. The two groups represented with the most data points costs for private insurance/medium complexity and no insurance/medium complexity. The median price for this procedure (among all 33 facilities represented) was about \$50,000 higher for a patient with no insurance. The final amount someone with no insurance may pay for that procedure could be considerably less the estimated \$80,000, as it is not uncommon for “self-pay” hospital bills to be negotiated down. A recent Schedule H benchmark commissioned by the American Hospital Association estimated charity care at approximately \$1.7MM per each of the over 500 responding hospitals (Ernst & Young, April 2013).

### **Data Confidentiality and Security**

As I have described data transparency is a key goal of the APCD movement. Since health care claims and eligibility data include what’s known as Personal Health Information (PHI), however, data confidentiality and security are also of paramount concern to those administering these databases. In order not to release any PHI—names, dates of birth, disease diagnoses, medication history, and other sensitive information—which may identify persons whose health care claims are contained in and APCD, many precautions are taken in protecting this information. Precautions include detailed guidance and processes in place for the security of data—from physical security to restricted data access and use rights (Porter et al, 2015). When public reporting is made from APCD data, additional security in the form of data suppression may be necessary to ensure patient confidentiality is not breached. APCDs will usually suppress small numbers from data tables or blank out other information from public view in order to reduce the risk that a user of that information could potentially discover the identity of a person represented in the data.

## POPULATION HEALTH ASSESSMENT IN THE APCD

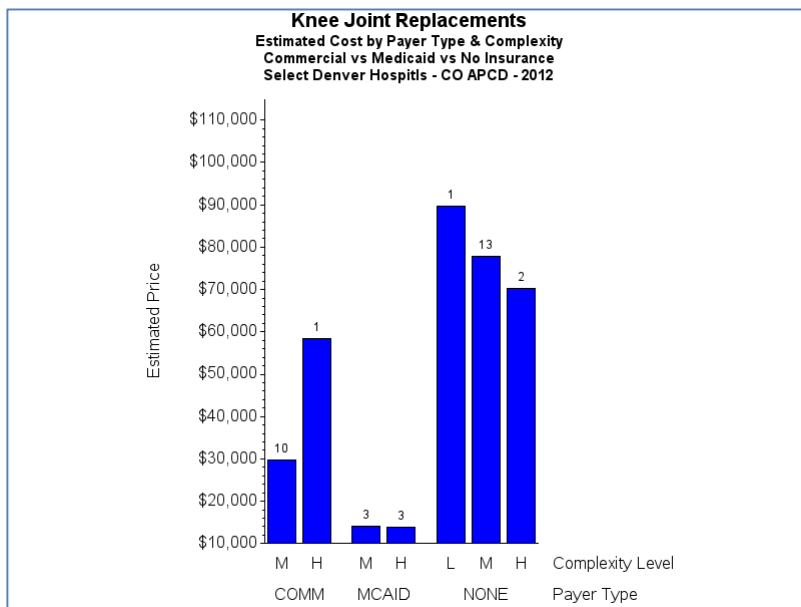
My final example of an analysis using CO-APCD data is an examination of health care utilization at a county population level by payer type. In this analysis I compare unadjusted and risk-adjusted views of the data. Figures 4-6 present health care utilization data by county and payer type. There are 64 counties in Colorado, so there are 128 county data points in each of these figures—one commercial (private) insurance population data point (represented by the letter “C”) and one Medicaid insurance population data point (represented by the letter “M”). The two axes are a discharge or visit ‘Index’ on the y-axis and a discharge or visit ‘Compared to Expected’ on the x-axis. The definitions of these metrics are presented above in the section, “Population Comparisons and Risk Adjustment.” In short, the ‘Index’ is a measure of how each county rate of events (discharges or visits) compares to the state average—1.0 equals the state average; 1.2 is 20% higher; 0.9 is 10% lower. This measure is not risk adjusted. In other words, one county may have a higher hospital utilization index because the population is older and less healthy and not necessarily because the health system in that county is inefficient. The ‘Compared to Expected’ (or C2E) measure, on the other hand, is risk-adjusted.

Facility	Median Price Est.	Complexity	Infection Risk	Definitely Recommend	Rated 9 or 10/10	Staff Explain Meds	Doctor Communicated Well	Nurse Communicated Well
Poudre Valley Hospital	\$51,745	M	Average	82%	79%	66%	78%	80%
Parker Adventist Hospital	\$80,129	M	Average	80%	77%	67%	81%	79%
Exempla Good Samaritan Medical Center	\$19,760	M	Average	79%	77%	65%	81%	77%
North Colorado Medical Center	\$58,338	H	Average	73%	75%	68%	82%	81%
Exempla Saint Joseph Hospital	\$21,203	M	Average	76%	74%	65%	80%	78%
Rose Medical Center	\$30,097	M	Average	78%	76%	63%	79%	76%
Sky Ridge Medical Center	\$30,846	M	Average	77%	77%	63%	77%	76%
Memorial Hospital Central	\$28,993	M	Average	70%	65%	68%	81%	84%
Porter Adventist Hospital	\$34,793	M	Average	75%	72%	62%	80%	77%
Presbyterian/St. Luke's Medical Center	\$94,299	H	Average	75%	70%	64%	79%	74%
Swedish Medical Center	\$26,713	M	Average	73%	69%	61%	75%	74%
Denver Health	\$16,489	H	Average	68%	69%	62%	77%	74%
University of Colorado Hospital	\$16,596	M	Average	70%	67%	60%	77%	72%
North Suburban Medical Center	\$12,589	H	Average	64%	63%	63%	79%	75%

**Table 4 – Comparative Hospital Quality Measures - Hospitals within 100mi radius of Denver, CO**

Data Source: [www.comedprice.org](http://www.comedprice.org) (Price Compare, Hospital Quality, Patient Perspective Rpts). CIVHC, 2015

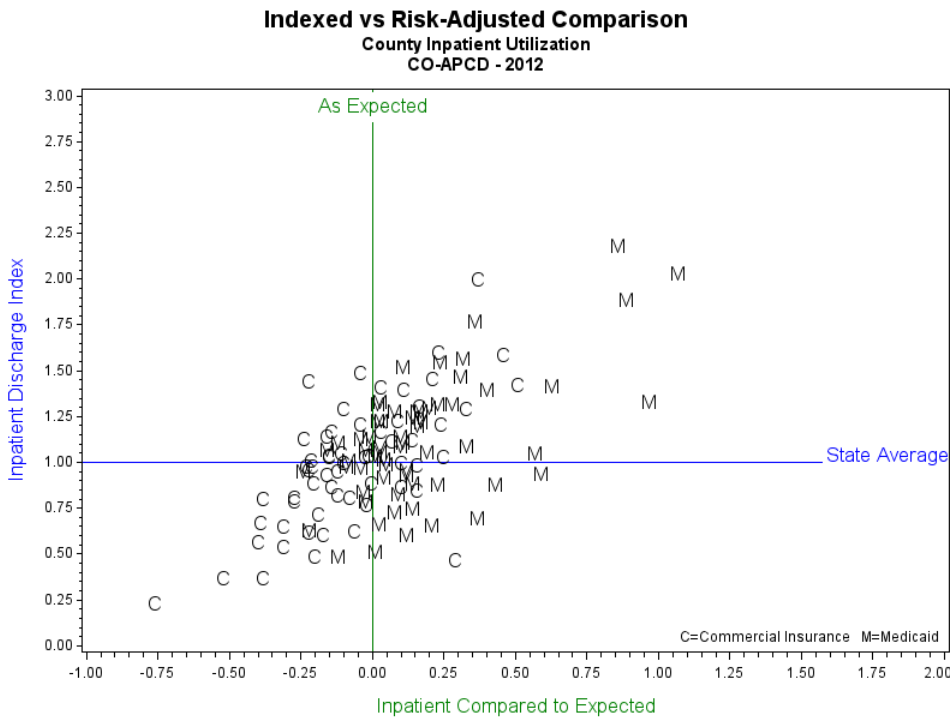
An expected level of service use given the age, sex, and population health risk of each county is calculated and compared to the actual service use of the population—if a county uses the expected amount of services the figure is 0%; if the population uses 20% fewer services than expected, the figure is -20%; if they use 10% more services than expected, the figure is 10%.



**Figure 3 – Knee Joint Replacement Costs**

**Data Source:** [www.comedprice.org](http://www.comedprice.org) (Price Compare Report). CIVHC, 2015

I examined both of these metrics simultaneously in the following figures (all graphs were produced using SAS® Graph PROC GPLOT). The blue line on Figure 4 represents the average state inpatient hospital utilization across the state as represented in the APCD (about 60 discharges per 1,000 insured persons per year—both commercial and Medicaid combined—in 2010). If the average hospital discharges per 1,000 persons in a county equaled that of the state, its Index would be 1.0. If the population of a county (represented in the APCD) experienced the exact number of discharges as expected given its population risk profile, its C2E would be 0%. Those counties falling above the state average and to the left of expected have higher rates of hospital utilization than the average county, but a lower rate than expected given the demographics and health status of their population. Conversely, those falling below the state average and to the right of expected have a lower hospital utilization rate than the state average, yet above what is expected given the demographics and health status of their population. As seen in Figure 4 it is primarily the Medicaid populations of several counties that fall into that category.



**Figure 4 – Inpatient Hospital Utilization by Payer Type**

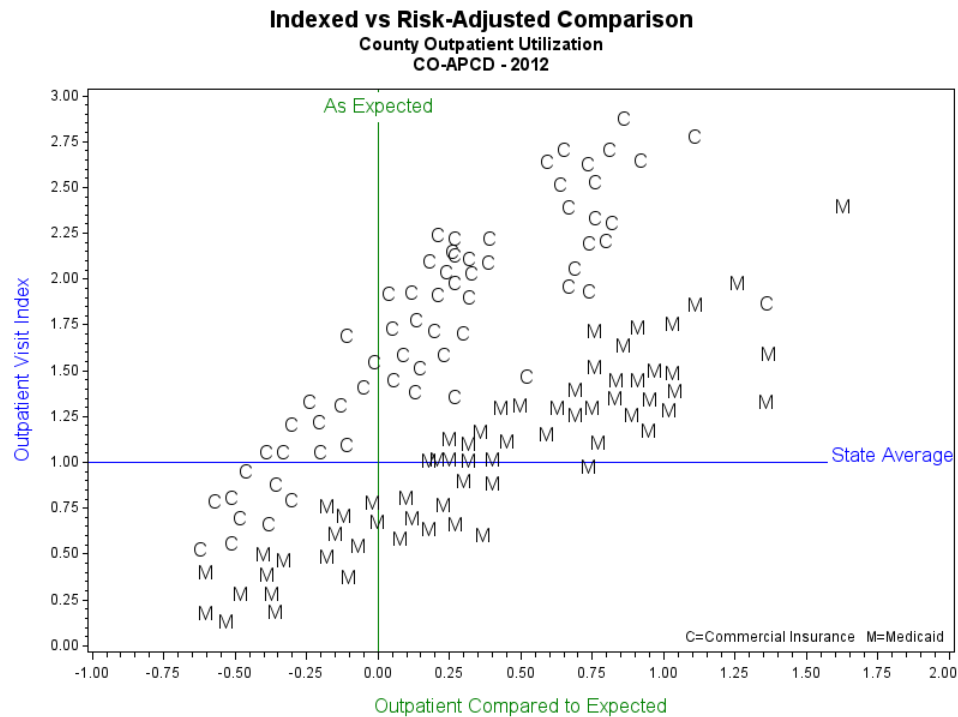
Data Source: [www.comedprice.org](http://www.comedprice.org) (Utilization Comparison Report). CIVHC, 2015

When we take a similar view of outpatient utilization—representing those healthcare services rendered in hospital, ambulatory care facility, rehabilitation center, clinic or other medical facility settings where the procedures and services delivered are either emergency in nature or are scheduled with patient release the same day—we see a much clearer demarcation between commercial and Medicaid populations (Figure 5). Of the populations who use a greater than expected amount of services the commercial population utilization is also much higher than the state average. Also, more Medicaid county populations than commercial county populations fall below both the state average and below expected utilization.

Finally, I examined emergency room visits (Figure 6), which is a subset of outpatient visits, and found greater similarity between the county Medicaid and commercial populations than was seen in total outpatient utilization, but less similarity than seen in inpatient utilization.

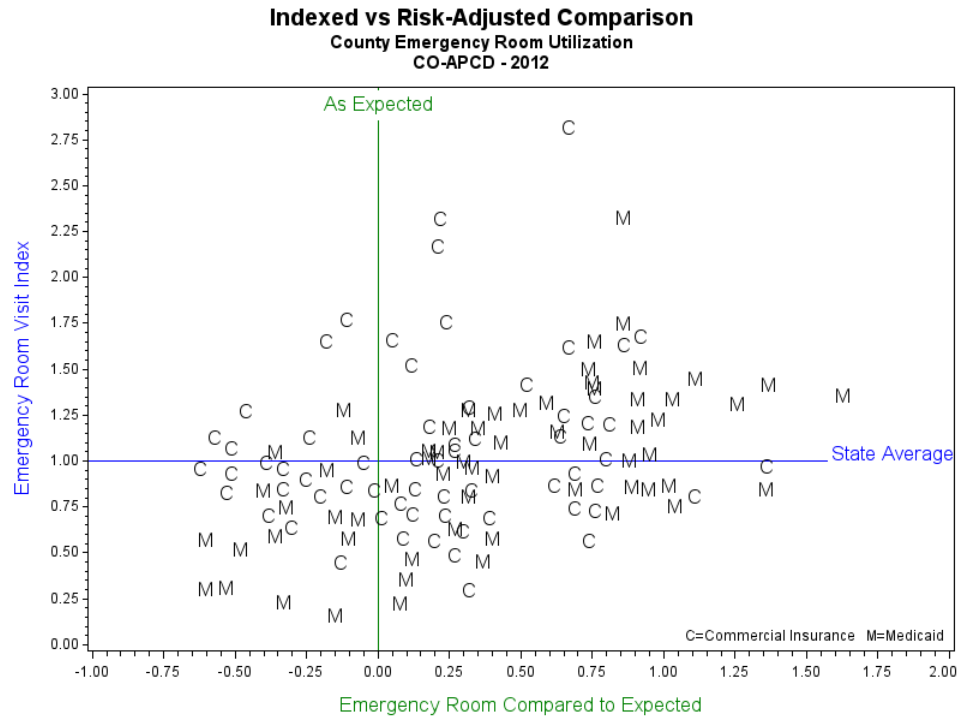
There could be many reasons for the different patterns seen in these data. When populations use a greater than expected use of hospital inpatient or emergency services, there may be an issue with accessing primary care. If commercial and Medicaid populations with similar risk profiles have different patterns of care, there may be access issues or benefit plan differences, or lower utilization rates could indicate a healthier population and success of health promotion or disease prevention efforts.





**Figure 5 – Outpatient Utilization by Payer Type**

Data Source: [www.comedprice.org](http://www.comedprice.org) (Utilization Comparison Report). CIVHC, 2015



**Figure 6 – Emergency Department Utilization by Payer Type**

Data Source: [www.comedprice.org](http://www.comedprice.org) (Utilization Comparison Report). CIVHC, 2015

## CONCLUSION

Nearly a dozen APCDs have appeared in the past decade; another half-dozen are in development and a dozen more are in consideration. There has been a proliferation of measures of various aspects quality in health care, particularly since the advent of early experiments in managed care in the 1990's. Technological developments in data production, storage, analysis and communication have allowed information sharing on a scale exponentially greater than most people could have imagined a generation ago. Public policy has come to endorse, facilitate and even require greater transparency in the health care marketplace. Experiments in value-based health care delivery have been demonstrating that the US health care system can deliver higher quality care for less money than has been its legacy, and that this can be accomplished while still offering financial rewards to those who manage the balance between population health and individual care. Each of the relevant issues in the development of increasing transparency and quality in the health care system today can in some way be represented in the development, operation, expansion, and use of All Payer Claims Databases (APCDs). APCDs have not only reflected the advance of transparency and quality improvement, but have helped to advance it.

## REFERENCES

- Agency for Healthcare Research and Quality (AHRQ). "Measures by Topic." National Quality Measures Clearinghouse. Accessed April 1, 2015. <http://www.qualitymeasures.ahrq.gov/browse/by-topic.aspx>
- Agency for Healthcare Research and Quality (AHRQ). "My Own Network, Powered by AHRQ." Accessed April 1, 2015. <http://www.ahrq.gov/professionals/systems/monahrq/>
- Agency for Healthcare Research and Quality (AHRQ). "Patient Safety Indicators Overview." Accessed April 1, 2015. [http://www.qualityindicators.ahrq.gov/Modules/psi\\_resources.aspx](http://www.qualityindicators.ahrq.gov/Modules/psi_resources.aspx)
- Anderson G, Reinhardt U, Hussey P, Petrosyan V. "It's The Prices, Stupid: Why The United States Is So Different From Other Countries." *Health Affairs* May 2003 vol. 22 no. 3, 89-105
- Averill RF, Goldfield N, Eisenhandler J, et al. "Development and Evaluation of Clinical Risk Group (CRGs)." Wallingford, Conn: 3M Health Information Systems. Final Report to National Institutes of Standard and Technology, US Department of Commerce; 1999.
- Barnes, J. "Moving Away From Fee-for –Service." *The Atlantic*, May 7, 2012. Accessed March 30, 2015. <http://www.theatlantic.com/health/archive/2012/05/moving-away-from-fee-for-service/256755/>
- Beck M. "How to Bring the Price of Health Care Out Into the Open." *Wall Street Journal*. Updated Feb. 23, 2014. Accessed March 28, 2015. <http://www.wsj.com/articles/SB10001424052702303650204579375242842086688>
- Berwick DM, Nolan TW, Whittington J. May 2008. "The Triple Aim: Care, Health, and Cost." *Health Affairs*. May 2008 vol. 27 no. 3, pp. 759-769.
- Center for Health Information and Analysis (CHIA). "Databook 1: Total Health Care Expenditures." September, 2013. Accessed April 1, 2015. <http://chiamass.gov/total-health-care-expenditures/>
- Center for Health Information and Analysis (CHIA). "Massachusetts Total Health Care Expenditure Methodology." December, 2013. Accessed April 1, 2015. <http://chiamass.gov/assets/docs/r/pubs/13/thce-methodology.pdf>
- Center for Health Information and Analysis (CHIA). "Mission and History." Accessed April 1, 2015. <http://chiamass.gov/mission-and-history/>
- Center for Value in Health Care (CIVHC). "Colorado Medical Price Compare Overview and Frequently Asked Questions." Accessed April 1, 2015. [http://www.civhc.org/getmedia/55d25b43-c61d-4d68-adcd-4338a7835f78/CO-Med-Price-Compare-Overview-and-FAQs\\_Final.pdf.aspx/](http://www.civhc.org/getmedia/55d25b43-c61d-4d68-adcd-4338a7835f78/CO-Med-Price-Compare-Overview-and-FAQs_Final.pdf.aspx/)
- Ernst & Young. "Results from 2009 & 2010 Tax-Exempt Hospitals' Schedule H Community Benefit Reporting." April, 2013. Accessed April 2, 2015. <http://www.aha.org/content/12/09-sche-h-benchmark.pdf>

Fillmore H, Dubard CA, Ritter GA, Jackson CT. September 21, 2013. "Health Care Savings with the Patient-Centered Medical Home: Community Care of North Carolina's Experience." Population Health Management.

Hammond E. "Success Factors for Creating Accountable Care Organizations." Health Affairs Blog. 4/20/14. <http://healthaffairs.org/blog/2011/06/03/success-factors-for-creating-accountable-care-organizations/>.

Health Care Cost Institute, Inc. "2013 Health Care Cost and Utilization Report." Oct. 2014. Web. <http://www.healthcostinstitute.org/2013-health-care-cost-and-utilization-report>

Health Resources and Services Administration. "What sorts of metrics assess quality improvement?" Accessed April 2, 2015. <http://www.hrsa.gov/healthit/toolbox/RuralHealthITtoolbox/PatientQuality/metrics.html>

Hicks J. The potential of claims data to support the measurement of health care quality. Santa Monica, CA. Rand Graduate School, 2003. Accessed March 23, 2015. [http://www.rand.org/pubs/rgs\\_dissertations/RGSD171.html](http://www.rand.org/pubs/rgs_dissertations/RGSD171.html)

Lohr K. Ed. Medicare: A Strategy for Quality Assurance. Washington D.C.: National Academy Press. 1990.

Maine Health Data Organization (MHDO). "Claims - The All Payer Claims Database (APCD)." Accessed April 1, 2015. <https://mhdo.maine.gov/claims.htm>

Mant J. "Process versus outcome indicators in the assessment of quality of health care." International Journal for Quality in Health Care Vol 13 No 6, 2001. pp. 475-80.

McKinsey Global Institute. "Accounting for the Cost of Health Care in the United States." January, 2007. Accessed April 2, 2015 [http://www.mckinsey.com/insights/health\\_systems\\_and\\_services/accounting\\_for\\_the\\_cost\\_of\\_health\\_care\\_in\\_the\\_united\\_states](http://www.mckinsey.com/insights/health_systems_and_services/accounting_for_the_cost_of_health_care_in_the_united_states)

National Committee for Quality Assurance (NCQA). "Measuring Performance." Accessed April 2, 2015. <http://www.ncqa.org/HEDISQualityMeasurement.aspx>

Porter J, Love D, Costello A, Peters A and Rudolph B. "All-Payer Claims Database Development Manual: Establishing a Foundation for Health Care Transparency and Informed Decision Making." APCD Council and West Health Policy Center, February 2015.

U.S. Department of Health and Human Services (HHS). "Read the Law." <http://www.hhs.gov/healthcare/rights/law/>. 4/19/14, (2014b).

## CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the author at:

Paul LaBrec  
Director, Research  
Populations and Payment Solutions  
3M Health Information Systems  
plabrec@mmm.com  
[www.3Mhis.com](http://www.3Mhis.com)

SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc. in the USA and other countries. ® indicates USA registration.