



## **WHY MEASUREMENT MATTERS**

# Population Health Measurement

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One of the biggest investments for many employers is paying for health care. Starbucks, for instance, at one time spent more on health insurance than they did on coffee.<sup>1</sup> Organizations spend millions, year after year. How well are those millions working?

The fact is most companies struggle to understand the health of their population. It's just too hard. Most employers deal with a range of health related partners from insurance carriers to multiple wellness vendors. Integrating and making sense of the multiple data streams—medical, pharmacy, dental, health risk assessments and biometrics—is a daunting task.

At Healthentic our mission is to change lives by making population health measurement easy. We crunch the numbers so employers don't have to. We help businesses make the right diagnosis regarding population health so they can fill the right prescription, and then we help follow up to see if the prescription is really working.

## Healthentic answers questions that really matter to an employer

- What is the per-member-per-month health expenditure for my population, broken down by demographic subgroups and by claim type (medical, pharmaceutical, and dental).
- What percentage of the medications we pay for are generic verse more expensive brand name drugs?
- Are our rates for hospital and emergency room utilization going up, or down?
- Are our people taking their medications as prescribed?
- Are our diabetics getting standard preventive care?
- How many of our people have one or more chronic diseases?
- What are the expected illness-related productivity losses for my population?
- How much is treatment of low back pain costing me?
- How far along are we towards implementing an effective organizational wellness plan?

## Most employers do not measure health outcomes

According to the 2013 Kaiser Family Foundation Survey of Employer Health Benefits, 99% of firms with 200 employees or more offer at least one health promotion program to their employees, but only a third or less measure health outcomes or return on investment.<sup>2</sup> This lack of outcome measurement is remarkable given how much illness and injury directly and indirectly cost American businesses. Clearly, companies have a vital interest in controlling their own health related costs, and there are a range of options for addressing health related costs, but any effective management strategy will involve outcome measurement when valid outcome measures are available. Launching programs while ignoring valid outcome metrics is irresponsible and irrational. This is especially true when the stakes are not just huge sums of money, but the very lives and wellbeing of millions of workers and their families.

## Health related costs are substantial and vary from employer to employer

In 2013 American employers paid on average \$4,885 per single worker and \$11,786 per family in health insurance premiums with total premiums (employer plus worker contribution) increasing 4% to 5% in 2013 (compared to general inflation of just over 1%).<sup>2</sup> Total annual insurance premiums (employer plus worker contribution) ranged from less than \$2,000 to more than \$9,000 for single worker and less than \$9,000 to more than \$23,000 for a family.<sup>1</sup> As high as premiums are, indirect costs due to illness or injury related productivity losses are thought to be two to three times the direct cost of health care.<sup>3</sup>

## Population health measurement is crucial for evaluating the effectiveness of health promotion programs

Two sorts of factors drive a firm's health related costs: market factors and population factors. Market factors include the unit price for health services, the unit value of labor versus labor substitutes, and the comprehensiveness and structure of employer-sponsored health insurance. Population factors include age distribution, incidence and prevalence of illness and injury, cumulative risk exposure, and patterns of health service utilization. For most American employers, the primary mechanism for controlling direct health related costs is the design of the health benefit plan, especially the degree to which costs are shifted to the employee and health service utilization is controlled. In the past, this was the *only* approach employers used to address health related costs. Health promotion programs, on the other hand, attempt to address health related costs from the other direction by modifying the behaviors and managing the risks that lead to illness and injury. But

unlike health insurance plan design, where the outcome in terms of per capita premiums can be predicted with actuarial precision, outcomes for any specific health promotion program are very hard to predict. This is why measurement of population health is so critical; without it, it is impossible to know if health promotion programs are working or not.

## Measuring population health is not easy

Given the importance of employee health (and the health of their dependents) and the near universal adoption of workplace health promotion, what can explain the relative lack of population health measurement by American employers? One partial answer is that obtaining and interpreting population health data can be relatively burdensome. Many companies carve out elements of their health benefit plan to different vendors, making it difficult to integrate the data. Moreover, health data, specifically medical and pharmacy claims, do not speak for themselves, but require specialized expertise to manipulate and interpret, a skill set most companies do not possess. Coupled with the hassle of population health measurement is perhaps a level of business skepticism about the effectiveness of health promotion; why measure population health if our ability to manage it is so uncertain?

## Health promotion works, but is it working for you?

There is abundant evidence that employer-sponsored health promotion can have positive outcomes, although much depends on the details of implementation.<sup>4,5,6,7,8,9,10,11,12,13,14,15</sup> Businesses, however, are less interested in the theoretical possibility of health promotion than in knowing if their own health promotion programs are working. To answer that question, a company will need a workable population health measurement system. Even for companies who are not yet invested in health promotion but are considering doing so, gathering baseline measurement will greatly facilitate any future program implementation and evaluation. So what population health metrics should companies use to guide and evaluate health promotion?

# Healthentic Metrics

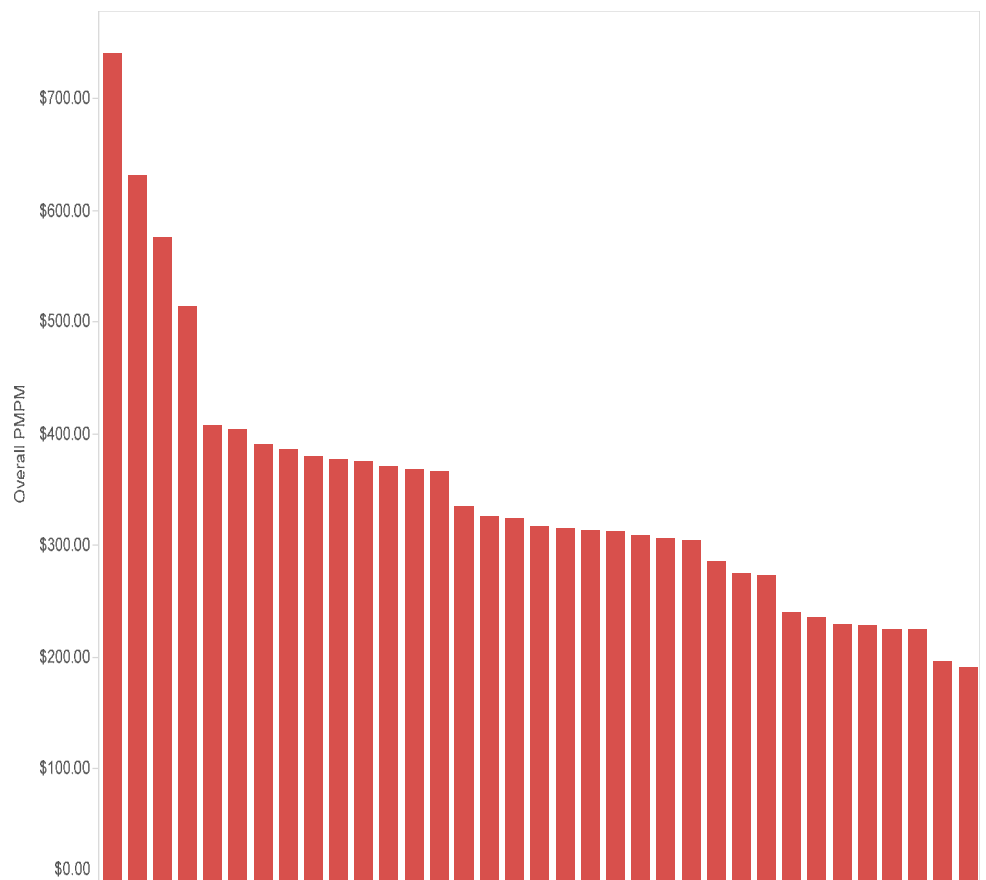
Thomas Parry, PhD, is a widely respected expert on population health metrics and president and co-founder of Integrated Benefits Institute. Dr. Parry has proposed a set of ideal business-useful population health metrics consisting of ten “health dimensions” and forty-nine “constituent metrics”.<sup>16</sup> What follows is a discussion of how some of these ideal metrics have been interpreted for thirty-four insured populations of varying size and demographics from the Healthentic Wellness Decision™ Engine (WDE). In addition, other metrics not addressed in the Parry article but useful to employers will be mentioned.

## Per-Member-Per-Month Expenditures

The amount and trend in direct medical expenditures, expressed in per-member-per-month dollars (PMPM), obviously affects the bottom line of businesses and is one key outcome measure for health promotion.

However, PMPM is a function of both the health of the insured population and market factors unrelated to health per se. That being said, if

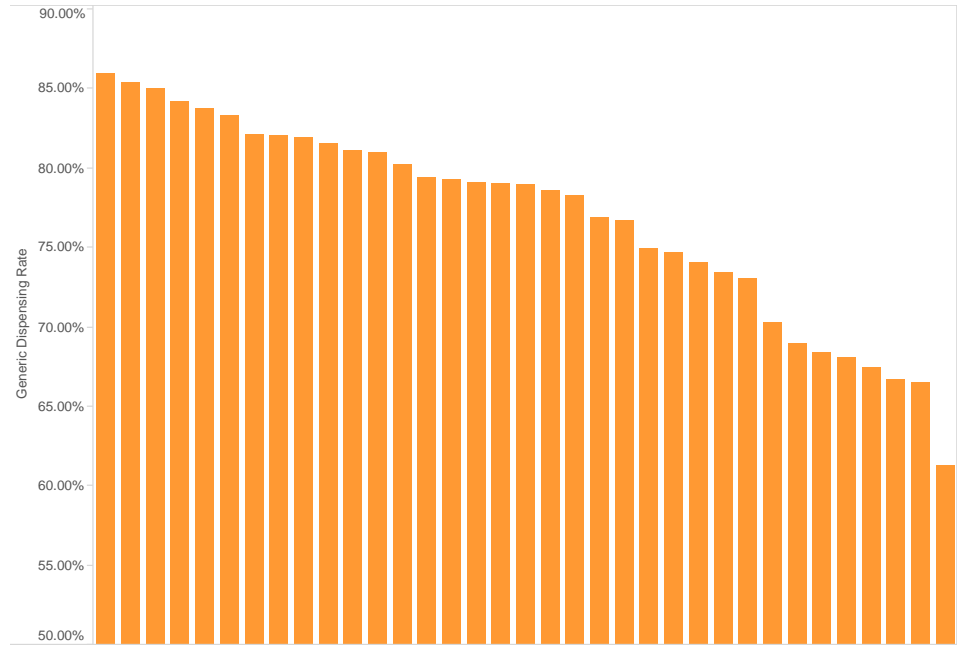
plan design and unit prices of medical services are comparable, differences in PMPM between groups or changes over time should reflect differences in utilization that are associated with differences in population health. PMPM can be calculated for the entire population overall, for demographic subgroups, or for specific claims types such as medical, pharmaceutical, or dental.



*PMPM* This chart shows the variation in overall PMPM among 34 different insured groups.

## Generic Dispensing Rate

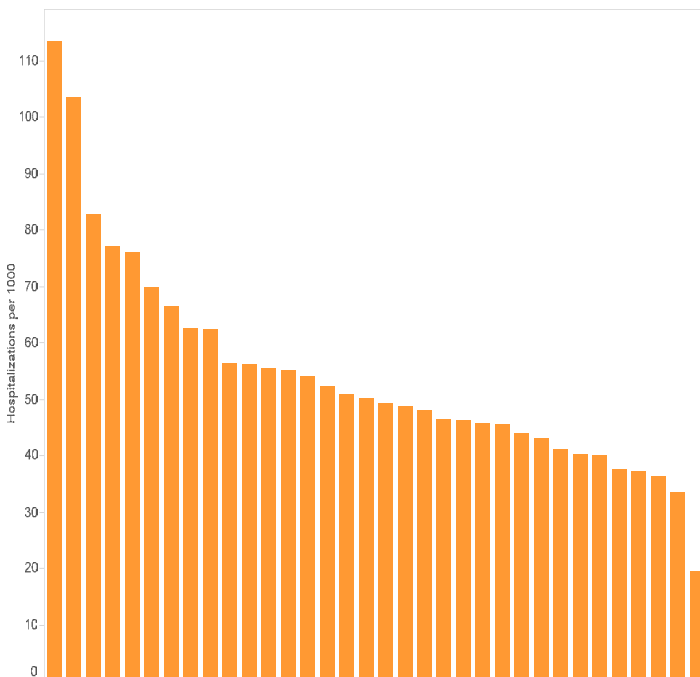
Brand name medications are often many times more expensive than generic versions of the same drug. Substituting generic for brand name drugs when doing so is safe and effective maximizes the cost effectiveness of pharmacy expenditures. Not all brand name drugs have a generic version, and in some cases physicians may have a clinical reason for ordering a brand name drug instead of its generic equivalent, but in general, the higher the generic dispensing rate, the lower the pharmacy PMPM will be for a given population.



**Generic Dispensing Rate** This chart shows the variation of in the generic dispensing rate among 34 different insured groups.

## Hospital Admission Rate

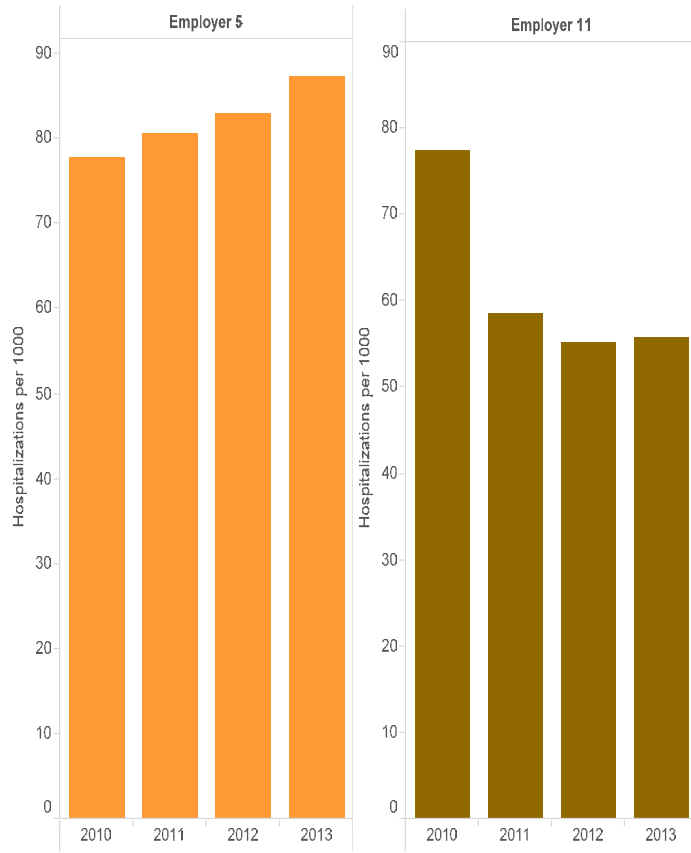
Perhaps the most robust utilization-based measure of population health is the rate of hospital admission.



**Hospitalization Rate** This chart shows the variation in number of hospitalizations per 1,000 lives among 34 different insured groups.

People only get hospitalized by physician order, and most people will comply with medical advice for hospitalization. Therefore, hospital admission is less affected by consumer discretion and more reflective of medical necessity than most outpatient health services. Variation in hospitalization rates between populations and over time reflect true differences in underlying population health, all else being equal. In the WDE data, the hospital admission rate for all groups ranged from a low of 20 to a high of 114 per 1000 covered lives, with an average rate of 55 per 1000 covered lives. The range of hospitalization rates reflects real differences in population health between

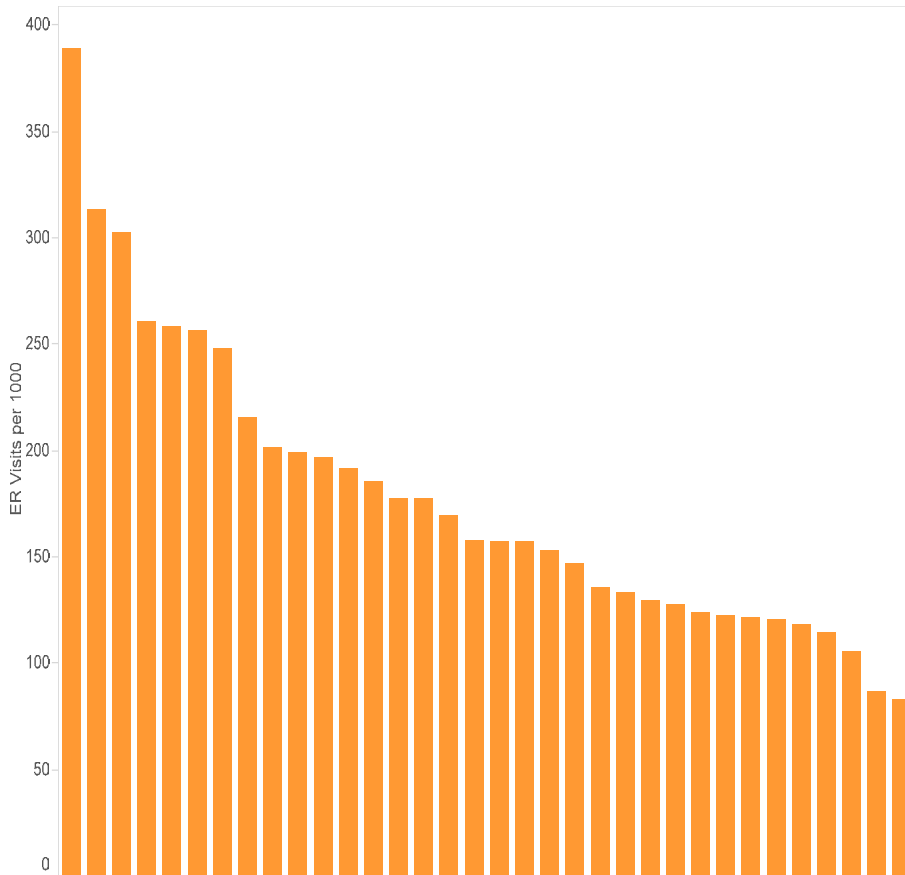
groups. Temporal trends in admission rates (above normal variation) will reflect changes in population health over time. For example, some groups in the WDE experience a steadily rising hospital admission rate in four years from 77/1000 to 87/1000 while other groups show a steady decline from 82/1000 to 55/1000. Tracking hospitalization rates over time, when interpreted in light of other important variables and the timing of health promotion programs, can help businesses see if their investment in health promotion is having an effect.



**Hospitalization Rate Trends** This chart shows examples of different trends in hospitalization rates 2010-2013.

## Emergency Room Visit Rate

Visits to the emergency room, unlike hospital admissions, are very much affected by consumer choice, access to alternative sources of health services, and benefit plan design. Nonetheless, the ER visit rate does reflect a degree of unplanned health service utilization, and therefore is an important if inexact indicator of population health. In the WDE, the average ER visit rate is 174/1000 covered lives with rates ranging from a low of 87 to a high of 390 per 1000 covered lives. As with hospital admission rates, ER visit rates can be compared to benchmarks and trended over time.



**ER Visit Rate** This chart shows the variation in number of emergency room visits per 1,000 lives among 34 different insured groups.

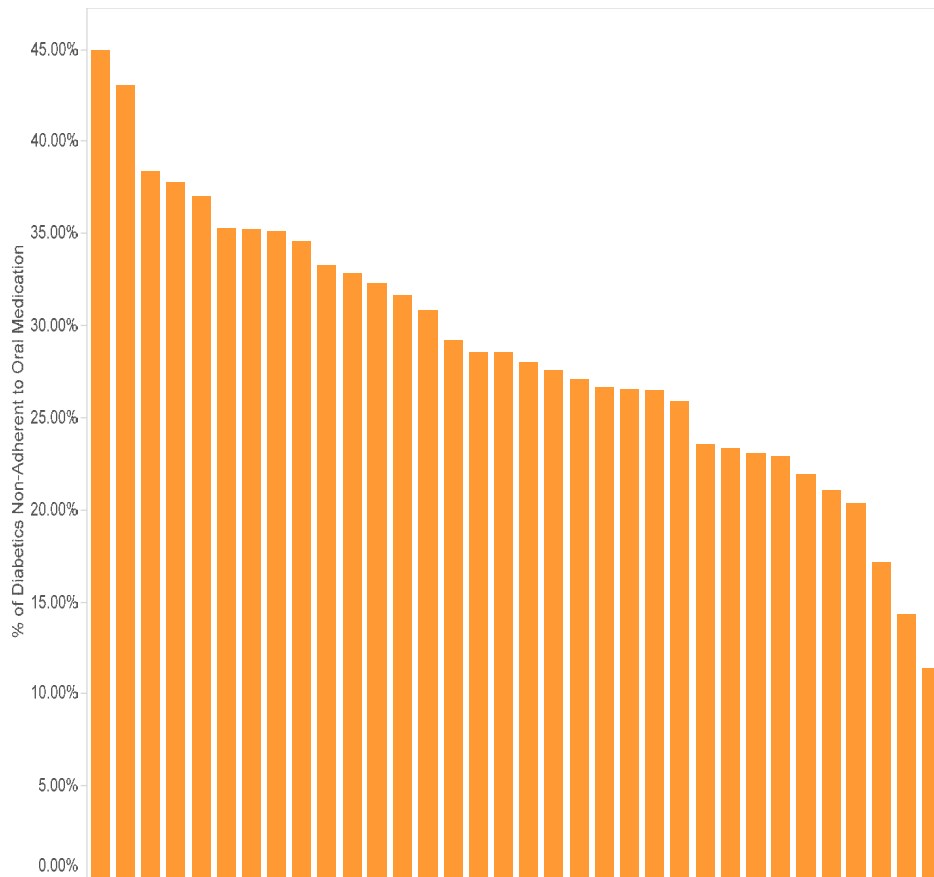
Overall rates of hospital admissions or ER visits are useful as general measures of population health, but further analysis of the primary reasons for hospitalization or ER visits can help determine if specific health promotion programs are working or may yet be needed. For example, trending the rate of hospital admission or ER visits for diabetes complications among diabetics would be crucial in determining whether a diabetes disease management program is needed or, if already implemented, is proving effective.

## Medication Adherence

For certain chronic conditions (such as diabetes, high blood pressure, and high cholesterol) consistent long-term pharmaceutical management is associated with lower medical expenditures and hospitalization rates.<sup>17</sup>

Using pharmacy claims, it is possible to calculate the medication possession ratio, a proxy measure of medication treatment adherence. Measuring the rate of medication adherence provides insight into the health of the population and the potential need for programs that could improve medication adherence, such as pharmacy benefit re-design, disease management, and health coaching.

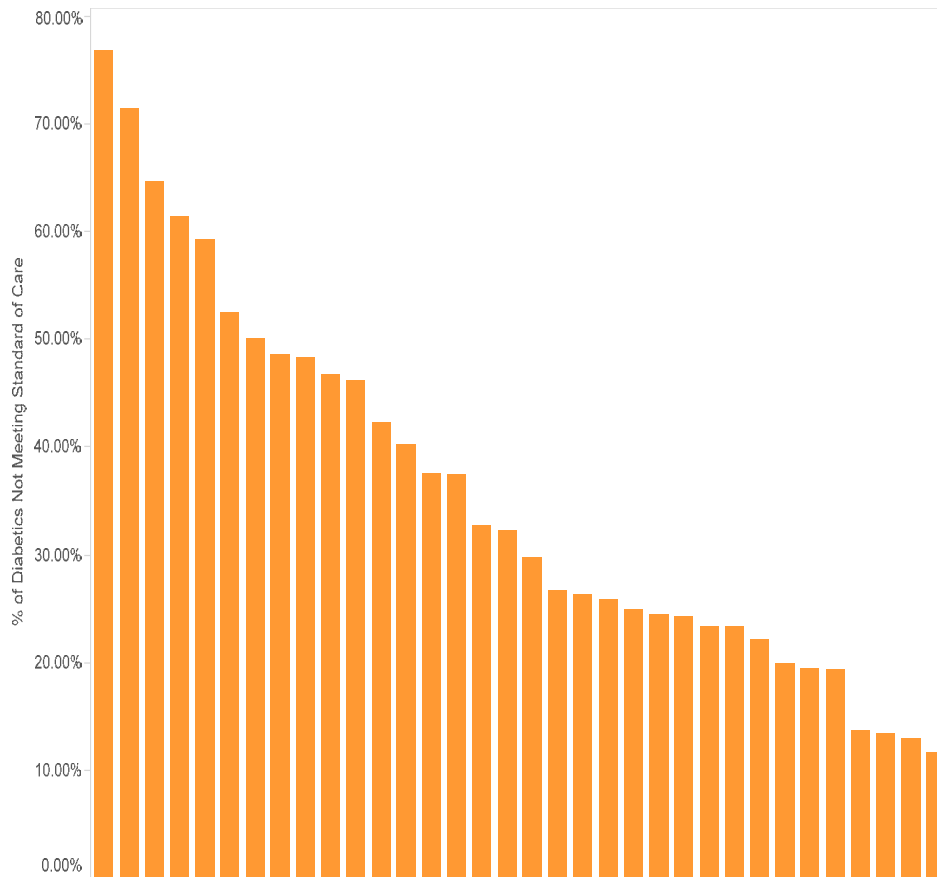




**Diabetes Medication Adherence** This chart shows the variation in percentage of diabetics with a medication possession ratio of at least 80% among 34 different insured groups.

## Diabetes Treatment Adherence

Persons with diagnosed diabetes are advised to seek additional health services to prevent or delay the development of complications.<sup>18</sup> Analysis of medical claims can reveal the percentage of diabetics who fail to obtain recommended health services such as comprehensive eye exam, lipid profile, HgA1c test, kidney function test, and a primary care physician visit. This metric is useful not only as a measure of health risk, but as an evaluation of the need for and effectiveness of diabetes disease management. Analysis of combined dental and medical claims makes it possible to identify diabetics who have under-treated periodontal disease, a potentially serious complication of diabetes for which aggressive dental care may be indicated.



**Diabetes Treatment Adherence** This chart shows the variation in percentage of diabetics who fail to meet treatment guidelines among 34 different insured groups.

## Prevalence of Chronic Conditions and Comorbidity

Analysis of medical and pharmacy claims can produce an estimate of the prevalence of specific chronic diseases and of comorbidity (having more than one chronic disease at a time), both key indicators of disease burden. Knowing the disease burden and the prevalence of specific diseases can inform decisions about a firm’s resource allocation for management of specific disease clusters.

## Productivity Losses

The Integrated Benefits Institute (IBI) has developed a rigorous statistical model of the total loss productivity attributable to major chronic illnesses. Using the prevalence rates of chronic illness calculated from claims data in combination with the IBI model (as used in the WDE), an employer can estimate the total number of lost work days due to each illness over and above what would be expected of an employee without the illness. This information gives an employer a better estimate of the total cost of chronic illnesses in their population and may help to prioritize certain health promotion efforts over others.

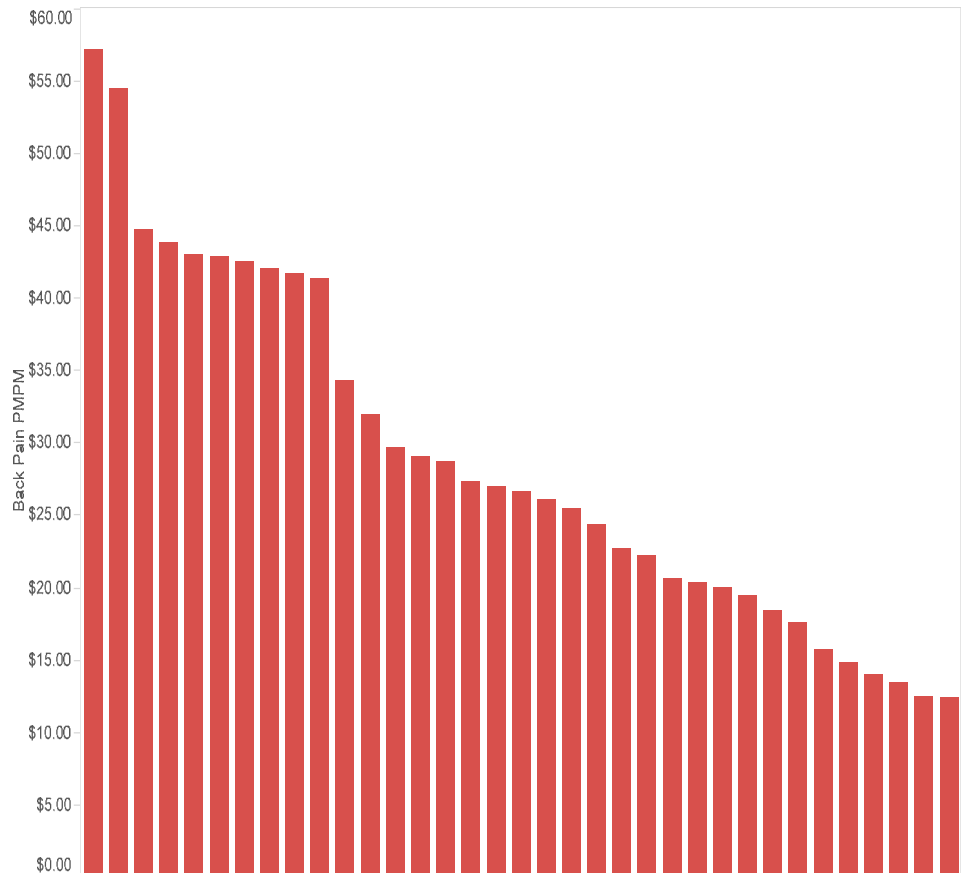
## Additional Metrics

### PMPM for Treatment of Low back Pain

Although not a measure specifically mentioned by Dr. Parry, many employers naturally want to know the PMPM for treatment of particularly expensive conditions. For many companies, low back pain (acute and

chronic) tops the list of costly conditions on a population level.

Knowing the amount spent on medical care for low back pain (or another costly condition) could help inform decisions about what disease management or injury prevention programs should be prioritized in a given population.

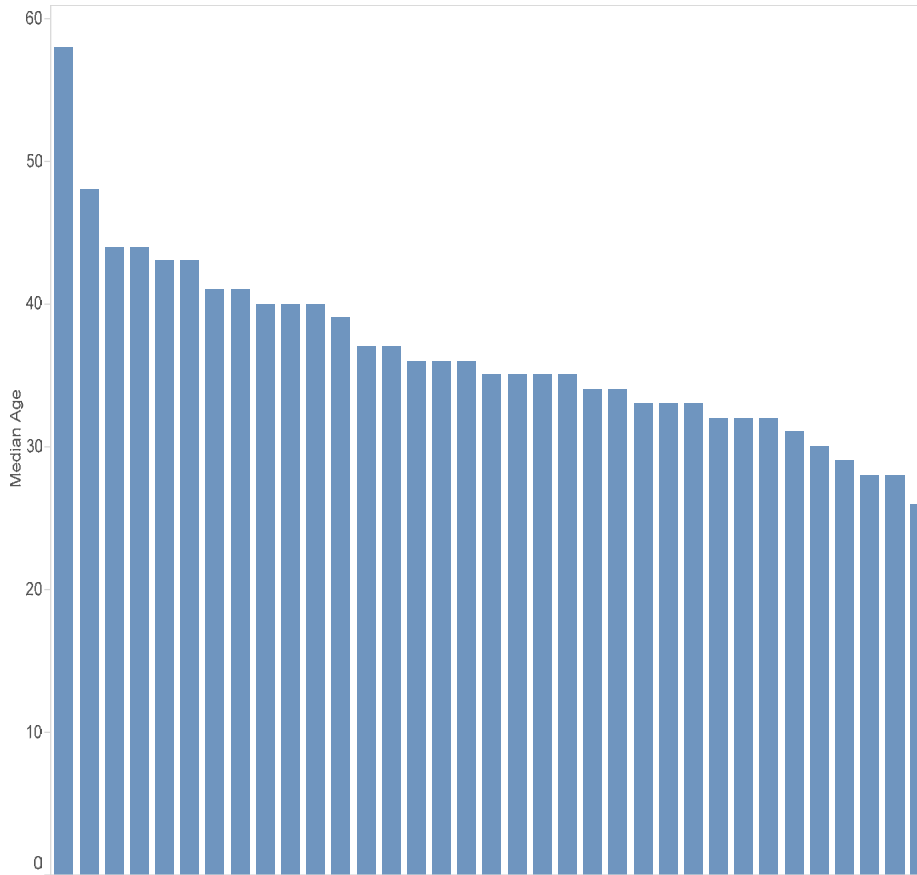


**PMPM for Treatment of Low Back Pain**  
This chart shows the variation of PMPM expenditures for treatment of low-back pain among 34 different insured groups.

### Median Age

Age is a critically important demographic variable influencing health status. Similarly, the age distribution of a population is critically important for interpreting population health metrics, especially when comparing data from different populations. Prevalence of chronic conditions and the rate of health service utilization are both highly correlated with age. Take for instance the lowest and highest hospitalization rates reported above from the WDE. The highest rate (114 admissions per 1000 covered lives) occurred in the population with the highest median age (59) while the lowest rate (20 admissions per 1000 covered lives) occurred in a population with a median age close to the average median for all groups (35). The difference in crude hospitalization rates between the two groups, although real, does not take into account the effect of age. Age adjustment methods are used to make comparisons between populations or against benchmarks. Without creating a statistically

rigorous age adjustment for each population metric, businesses can get a sense of the age distribution of comparison populations by referring to the respective median ages.



**Median Age** This chart shows the variation in the median age among 34 different insured groups.

## Biometrics

Measures of physiologic function or condition (such as blood pressure, body mass index, waist circumference, blood glucose, or cholesterol level) are key indicators of potential health risk but are not included in medical or pharmacy claims. Businesses who are invested in health promotion commonly gather this data through health questionnaires or by clinical examination. A key limitation to most biometric data sets gathered in employer sponsored health promotion programs, at least in terms of population health measurement, is a low response rate (especially among non-employee dependents) and a high risk of selection bias that undercuts the ability to characterize the entire covered population from available data. Even given these drawbacks, biometrics can be useful for a number of reasons. First, although voluntarily submitted biometrics are not likely to be representative of the entire population, as a convenience sample they do reflect on that portion of the population most likely to be interested in and respond to health promotion. Secondly, if biometric values can be linked to an individual's claim history, one can make a preliminary judgment as to whether the individual with higher-risk biometric values is under appropriate medical care for conditions related to the biometric, and if so, if the biometric is improving with time. Although the lag time in processing medical claims prevents this sort of

analysis from being used in tailored health promotion outreach, it does provide a metric of under-utilization which can be trended over time (see table below for example).

## Cross-Tabulation of Biometrics and Claims Data for an Insured Population

High Risk Group	Risk Group Definition	Persons with High Biometric Value in Index Year N (% of total)	Persons with High Biometric Values and No/Minimal Related Claims*	Percentage of High-risk Group with No/Minimal Related Claims*
High Blood Pressure	One or both of: <ul style="list-style-type: none"> <li>▪ Systolic =&gt; 140mmHg</li> <li>▪ Diastolic =&gt; 90mmHg</li> </ul>	646 (15%)	21	3.25%
High Cholesterol	One or more of: <ul style="list-style-type: none"> <li>▪ Total cholesterol =&gt; 240 mg/dL</li> <li>▪ Triglycerides =&gt; 200 mg/dL</li> <li>▪ LDL =&gt; 160 mg/dL</li> </ul>	497 (11%)	9	1.81%
High Blood Sugar	One or more of: <ul style="list-style-type: none"> <li>▪ Fasting blood glucose =&gt; 100 mg/dL</li> <li>▪ Random blood glucose =&gt; 200 mg/dL</li> <li>▪ HbA1c =&gt; 5.7%</li> </ul>	145 (3%)	34	23.44%

*Biometric value remained high or was missing in the follow-up year. Analysis of claims for all three years (prior-to-index, index, and after-index) was performed in the Wellness Decision™ Engine.*

## Lifestyle Risks

The cumulative lifetime exposure to health risks is associated with adverse health outcomes. The greater the risk exposure in terms of intensity or duration, the greater the likelihood of adverse health outcomes resulting in higher medical expenditures.<sup>4,9</sup> Some health risks are measured with biometrics, but many are behaviors such as substance abuse, physical inactivity, and dietary choices. As a practical matter, the presence of such risks can only be detected by self-report. Health risk questionnaires are used in health promotion programs as an intervention in their own right (as form of health behavior feedback and education), to identify individuals for health promotion outreach, and to aggregate self-reported data for population health measurement in the form of risk prevalence. As important as lifestyle risks are to population health measurement, health risk questionnaires are vulnerable to a host of biases in addition to selection bias, and the instruments themselves are anything but standardized, making comparison of results between populations problematic. Yet with all of

these drawbacks, health risk questionnaires do provide crucial information about a self-selected group, and the risk factors identified by questionnaires do correlate with other metrics of health.<sup>5,8</sup> As with biometrics, questionnaire results can be linked with individual claim history to check for evidence of appropriate medical management of reported conditions or risk factors. Health questionnaires are also a way to gauge the level of interest in various health promotion programs, data which can prove invaluable for program planning. Health questionnaires are also the primary mechanism employers have to gather data about health related productivity losses, counted in terms of days absent from work (absenteeism) or loss of productivity while at work (presenteeism).

## Organizational Wellness Profile

The metrics discussed thus far have been health outcomes, but outcomes are not achieved without organizational commitment of resources, but how much, and in which areas? The WDE provides measurement of organizational commitment using a scoring system that looks at all aspects of employer-sponsored health promotion, including leadership, environment, education, and specific health promotion programs. By completing a Wellness Profile in the WDE, a company can identify what steps are necessary to build an effective health promotion program and track progress over time.

The screenshot displays the 'Wellness Action Plan' interface. At the top right, there is a yellow button labeled 'Export & Print Plan PDF'. Below the title, there are five tabs: 'Summary' (selected), 'Leadership & Support', 'Supportive Environment', 'Education & Awareness', and 'Employee Programs'. The 'Summary' tab contains two paragraphs of text. The first paragraph states: 'The Wellness Action Plan is designed to give you a starting point for building a strategic, comprehensive health and wellness program. Initially, your efforts will be focused on building an internal support system and creating awareness around your health and wellness efforts and programming.' The second paragraph states: 'A well-balanced health and wellness strategy that looks to improve each aspect of health and wellness will have the biggest impact. Strive to plan at least 1 action in each of the 4 areas of health and wellness: Leadership & Organizational Support, Supportive Environment, Education & Awareness, and Employee Programs.' On the right side, there is a box titled 'Your Profile Score' which features a progress bar and the text 'Overall Score' and '38 out of 106'. Below the score, there is a note: 'Based on your profile responses, this rating is an indicator of the current state of your overall health and wellness culture and programs.'

## Summary

In summary, health related costs, including both the direct costs of health expenditures and the indirect costs of health related productivity losses, are major drags on American businesses. Many of the factors underlying health related costs, some market-based and others population-based, are modifiable and differ from population to population and over time within a single population. Health promotion programs seek to modify the underlying health of a population. In order to evaluate and guide health promotion programs, employers must make use of valid measures of population health. All of the measures suggested in this paper are at least plausible measures of population health. Employers must still address the challenges of gathering and interpreting the necessary data to construct these measures, but there are increasingly more options for doing so as the field of commercial health informatics continues to develop.

## End Notes and Works Cited

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<sup>1</sup> (Noon 2005)

<sup>2</sup> (Claxton, et al. 2013)

<sup>3</sup> (Loeppke 2008)

<sup>4</sup> (Edington, Yen and Witting 1997)

<sup>5</sup> (Edington 2001)

<sup>6</sup> (Yen, et al. 2003)

<sup>7</sup> (Burton, et al. 2006)

<sup>8</sup> (Hill, et al. 2009)

<sup>9</sup> (Goetzel, Carls, et al. 2009)

<sup>10</sup> (Baicker, Cutler and Song 2010)

<sup>11</sup> (Goetzel, Pei, et al. 2012)

<sup>12</sup> (Lerner, et al. 2013)

<sup>13</sup> (Mattke, et al. 2013)

<sup>14</sup> (Rongen, et al. 2013)

<sup>15</sup> (Pelletier 2011)

<sup>16</sup> (Parry and Sherman 2012)

<sup>17</sup> (Sokol, et al. 2005)

<sup>18</sup> (American Diabetes Association 2014)

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