Health Care Payment Reform: Bundling Payments to Fight Rising Health Care Costs

JOSEPH LANG

University of Washington Bothell

Master of Arts Policy Studies

Capstone Paper

Capstone Advisor: Santiago Lopez

Second Reader: Andrea Stone

June 1, 2012

Table of Contents

Abstract……………………………………………………………………………………………………....Page 2

1. Policy Problem Background……..………………………………………………………………………….…..Page 3

1.1 Inefficiency of "Fee-for Service" Payment System……………………………………….Page 5

1.2 Proposed Policy Solutions……………………………………………………………….……Page 6

2. The Bundled Payment Approach……………………………………………………………….…..Page 8

2.1 Law and Politics………………………………………………………………………………………..Page 11

2.2 Policy Goals of a Bundled Payment Model…………………………………………………..Page 14

2.3 Advantages of the Bundled Payment Approach……………………………………………Page 14

2.4 Disadvantages of the Bundled Payment Approach………………………………………Page 16

2.5 Risk to the Patient Consumer…………………………………………………………………. Page 19

3. Methods and Data…………………………………………………………………………………………Page 22

3.1 Secondary Data Source 1: Healthcare Cost Utilization Project Data………………Page 23

3.2 Secondary Data Source 2: Health Care Incentives Improvement Institute………Page 25

3.3 Use of Secondary Data Sources…………………………………………………………………Page 27

4. Results……..Page 28

5. Discussion ………………….……………………………………………………………..…………………..Page 30

6. Conclusion……………………………………….…………………………………………………….……..Page 32

6.1 Policy Implications…….………………………………………………………….………………Page 33

6.2 Limitations of the Analysis and Future Research…………………………………………..Page 34

7 References……Page 37

Figures List

Figure 1: Bundled Payment versus Fee-for-Service Payment……………………………………………Page 42

Figure 2: Capitation Diagram………………………………………………………………………………………Page 43

Figure 3: Diagnosis-Related Groups (DRG) Diagram………………………………………………………Page 44

Figure 4: Estimated Bundled Cost Formula…………………………………………………………………Page 45

Figure 5: Patient PAC percent - acute medical conditions…………………………………………..Page 46

Figure 6: Linear Regression Graph…………………………………………………………………………….Page 47

Figure 7: HCUP Episodes: Annual Savings from PPM……………………………………………… .Page 48

Figure 8: Annual PPM Savings Percentage………………………………………………………………...Page 49

Figure 9: Yearly Fee-For-Service Cost and Trends in Billions………………………………………..Page 50

Figure 10: Aggregate FFS Cost & PPM Savings……………………………………………………………………………Page 51

Tables List

Table 1: HCUP Data Table………………………………………………………………………………………Page 52

Table 2: HCI PMPM Calculator and Data……………………………………………………………………..Page 53

Table 3: Weighted HCUP Data Table…………………………………………………………………………Page 54

Table 4: Organizations that have used tested and validated HCI PAC analytical packages…………….Page 55

Table 5: Calculation of Trend Savings Percent……………………………………………………………Page 56

Table 6: Aggregate PPM Savings & FFS Costs Controlled for Population Growth……………..Page 57

Abstract

In 2006 Massachusetts passed unprecedented health care reform legislation in an effort to extend health insurance coverage to nearly all residents of the state. The health care reform legislation has lowered the number of uninsured residents in the state however the cost of health care has continued to grow. Rising costs threaten the stability of the state's landmark 2006 health care law. The Patient Protection and Affordable Care Act was signed into law by President Obama In March of 2010. This Health care reform bill follows in the footsteps of the Massachusetts law by working to provide affordable care to all U.S. citizens. This reform movement is now on the national stage and much debate occurs regarding whether it is just and how it should be structured. Application of health care reform laws are currently being discussed in congress and across the nation. The financial viability of any health care reform measure should be at the core of this important debate.

A promising solution to health care spending is controlling costs by utilizing a bundle payment system. This could eliminate the inefficiencies currently existing because of the multi-tiered fee for services system. Through the analysis of existing models and data, it is evident that utilizing a bundled payment system will reduce the cost of health care on a national level and improve the quality of the care delivered.

I used Health Care Utilization Program (HCUP) data along with a PROMETHEUS calculation provided by the Health Care Incentives Improvement Institute (HCI), to predict the cost difference of specific acute care episodes in a fee-for service system versus a bundled

payment system called PROMETHEUS. This analysis includes only certain specific types of acute episodes of care which account for 30% of the national healthcare expenses. For the values in 2010 through 2012, a polynomial trend line was plotted to find the projected value in these years. This research and analysis calculates savings from 1997 through 2015 will equal a total of $376.32 billion, if a PROMETHEUS Payment system had been implemented. This research also indicates that utilizing a PROMETHEUS Payment Model could potentially increase the quality of health care. The PROMETHEUS model focuses on driving down the costs of services by limiting the need for patient readmissions. The PROMETHEUS Model allows a set amount for Potentially Avoidable Costs (PAC) and the PAC's incentivize hospitals and doctors to prevent avoidable costs in order to collect the PAC stipend as a bonus. By minimizing patient readmission and reducing avoidable complications, health care quality could be improved.

1 Policy Problem Background

In 2006 unparalleled and innovative health care reform legislation was passed in Massachusetts which strives to afford health insurance coverage to all residents of the state. The health care reform not only strives to have all residents covered but also aims to bring quality and affordable health care to the residents of Massachusetts. The reform intends to do this through expanding consumer access to private and public insurance coverage (*Massachusetts DOR*, 2009). This legislation was designed in response to a nationwide health care problem. According to Michael Tanner (2008), quality of care is historically uneven and the

health care system is riddled with waste. The Massachusetts health care reform is a landmark legislation that is believed by many to have effectively driven down the rate of uninsured to nearly half it was originally ((Eibner, Hussey, Ridgely, & McGlynn, 2009). In the year 2008, less than 2.6 percent of Massachusetts residents were still uninsured, this is considerably lower than the national average which rests at 15 percent (Eibner, Hussey, Ridgely, & McGlynn, 2009).

The health care reform legislation has lowered the number of uninsured residents in the state however the cost of health care has continued to grow. The continued increases of the cost of health care services threaten the legislation's long-term viability. Without further policy change health care spending in Massachusetts is expected to continue to rise. It could likely double in size and reach $123 billion by 2020(Eibner et al., 2009). This would be a rate that would equal an increase that is 8 percent faster than Massachusetts' gross domestic product (Eibner et al., 2009). By calculating health expenditures as a percentage of Gross Domestic Product (GDP), future expenditures can be calculated in an effort to project what will likely occur. A realistic goal is to keep health care spending to the same level as the growth of GDP. If this is accomplished, spending on health care could be decreased to $107 billion by 2020 (Eibner et al., 2009). This may be a way to limit the health care spending from consuming a larger and larger amount of the state's economy. Rising health care costs will only continue to threaten the stability of the current high profile legislation. The landmark reform law is great in many ways but is expected to increase per capita health care spending in the state. According to Special Committee reports, per capita health care spending in Massachusetts is projected to increase 70 percent from over $10,000 in 2010 to nearly $18,000 in 2020 (*Associated Press*,

2011). The Massachusetts health care reform accomplishes many good things; however, in order to become sustainable, it must find a way to be cost effective and financially viable.

1.1 Inefficiency of "Fee-for-service" Payments

Currently "Fee-for-service" payments are a common method of reimbursement for health care services. In this payment model, each service provided is priced and paid for separately (Eibner et al., 2009). As an example, a visit to a doctor's office will be billed out as time spent with the doctor plus separate charges for collecting blood or other specimens. A laboratory will then run tests on the blood or specimen sample and charge another fee for the testing and interpretation of results. The prevailing thought is that, "Fee-for-service" payment systems are credited with the lack of coordination between providers. It is believed that this causes waste because services are overused, yet this overuse does not increase level of health benefits (*MEDPAC*, 2008). Additionally, the Fee-for service system may encourage doctors to order unnecessary tests and services to increase profits ((Bodenheimer & Grumbach, 2009). By redesigning the payment methods Massachusetts could capitalize on a large opportunity of savings. Eighty three percent of commercial health insurance payments are released for fee-for-services type transactions (*MDHCFP*, 2009). If a new bundling payment system is implemented it could reduce the rising cost of health care and begin to eliminate the overlap and waste of the current fee-for-service system. My research will calculate the savings potentially attainable from implementing a bundled payment system. This will be shown through analyzing historical

costs under the Fee-For-Service System and applying calculations of savings if a bundled payment strategy had been implemented.

1.2 Proposed Policy Solutions:

A predominate policy solution to minimizing the ever increasing costs of health care is to utilize a new and dynamic bundled payment model for health care services. The objective is to utilize a payment design that not only improves the quality of care but also improves the efficiency of the health care system. By bundling payments, a single payment is made for services related to the specific condition or treatment. This payment would be compensation for all providers of service and could include services across certain health care settings. This bundled payment concept is explained in the diagram provided in (**FIGURE 1)** "Bundled Payments vs. Fee-for-Service: Concept" (Division of Health Care Finance and Policy [DHCFP], 2011, p. 12). This diagram precisely illustrates the way in which payment dispersals are made through Bundled Payment and Fee-for-Service Payment Systems. The diagram also explicitly highlights the difference between the two systems. There are two primary differences in the way business is conducted under the bundled payment system. The first relates to the transaction between the insurers and the providers and the second relates to the transaction between the providers and the patient. The diagram in (**FIGURE 1)** helps to conceptualize this concept by showing how the providers are grouped together into a comprehensive assembly. This not only describes the way medical payments are made in a bundled payment system but also indicates the collaboration that must exist between all providers delivering care to the patient for the single episode of care. Under the bundled payment system patients would

interact with a unified consortium of providers instead of interacting with dispersed providers. The implied idea is that care will become more coordinated and quality of care will improve because of this.

Bundling Payments is a strategy that attempts to address the dynamic aspect of health care and the need for controlling costs through payment reform. The appealing aspect of the idea is that it adds a budgeting aspect to health care payment models. Expected costs of specific diseases, conditions and treatments are calculated and are used as a basis for payments to providers for care delivered to patients. Payments allow providers to better manage the individual patient's disease or condition (Eibner et al., 2009). The bundled payment approach is a reimbursement strategy for health care providers where a single fee is paid to providers for the costs of clinically defined episodes of care. There are many names used to describe the bundled payment concept including package pricing, packaged pricing, global payments, global bundled payment, episode-based payments, episode-of-care payment, episode payment, evidence-based case rate, and case rate. As the bundled payment theory has emerged, these terms have been used in describing the model in a deeper sense. The Massachusetts Special Commission on the Health Care Payment System recommended utilizing a global payment strategy that would bundle payments for a specific patient within a certain period of time. The proposed bundled payment model is more dynamic than the global payment method because the period of time aspect is not as finite but is able to adapt to the specific episode being treated. Private and public health care providers could implement the new episode based on a bundled payment model to reduce prices of services by reducing wasteful services that add to the overall volume of services (Eibner et al., 2009).

Policy and law makers, hospitals, physicians, insurance companies, concerned citizens, patients, and many other constituents and stakeholders have expressed a strong interest in health care payment reform. The interest is out of concern that the current fee-for-service payment system is not a financially accountable plan and has a negative draw on the quality of health care. Fee-for-service payments structurally create blocks or fragmented portions of care. By having separate payments to each provider of services within the same episode of care, the care becomes split up into pieces and is irregular in its delivery. Stakeholders seem to believe that payment reform can considerably help as a solution and is vital for the long-term financial stability of the health care system. Under the current fee-for-service payment system health care costs have continued to increase and care has become segmented, preventing an even and uninterrupted delivery of care. To evaluate the potential net savings that can be realized through implementation of a bundled payment model. The research also evaluated the level to which a bundled payment technique can improve the quality of health care services provided because of improvements in the assimilation of health care services.

2 The Bundled Payment System Approach

Although few bundled payment approaches have been implemented and evaluated, some preliminary evidence supports the conclusion that they would result in reduced spending. Several evaluations that analyzed specific areas of health care like acute care services, demonstrated cost reductions from a bundled payment approach (*MEDPAC*, 2008). In the early 1990's the Medicare Participating Heart Bypass Center Demonstration conducted the largest

evaluation of bundled payment models. They tested payments and looked at the individual episode and what services were required including all inpatient and physician services. It also included services required during hospitalization, readmission and physician services related to follow-up care conducted by surgeons. They did not include any other pre or post hospital discharge services conducted by physicians (Liu, Subramanian, & Cromwell, 2001, p. 39-54). An evaluation found that hospitals participating in this bundling payment plan were able to reduce “direct variable costs” over the three-year period of time. It was also found that physicians improved efficiency by changing their practice routines (Liu et al., 2001, p. 39-54). This program was found to save an average of 10 percent in participating hospitals (Cromwell & Dayhoff, 1998). Other Organizations have estimated savings related to unique bundling payment models and found an indication of a positive potential. The Commonwealth Fund used a scenario of widespread bundled payment in the Medicare program, with payment rates set at a benchmark based on geographic areas with relatively low average Medicare spending (Shoen et al., 2007, p. 89). They estimated net cumulative savings to national health spending of $96.4 billion over five years and $229.2 billion over 10 years (Eibner et al., 2009).

The bundled payment system is a comprehensive payment approach for compensating health care providers for services given to patients. It is also called an episode-based payment system because it focuses on paying for the illness event not paying separate providers for their stake in the services (Liu, Subramanian, & Cromwell, 2001). A bundled payment distributes a payment for the episode and this payment compensates multiple providers in a single payment. The objective is to lower the overall cost and improve the quality of health care to patients. By presumably controlling costs, making the health care delivery systems better integrated and

revamping the delivery structure of primary care, the bundled care system is expected to be a good answer to problems occurring in current fee-for-service and capitation models.

The capitation model is a payment technique where hospitals or clinics receive a set amount of pay for each individual patient they are responsible to for offering care and services. In this sense, the term "capitation" can be thought of as a "per head" or per person payment which the primary service provider (i.e. hospital) receives. Capitation payments cover payment of all types of clinically defined diseases, illnesses and or episodes for a particular patient for a specific time period. The illustration in **FIGURE 2** is a diagram representation of dispersals made in a two-tiered capitation model for health care payments and helps conceptualize the payment strategy.

The proposal for a bundled payment system includes single payments for specific episodes, for a set amount of time. Other forms of bundled payment approaches that are in practice include diagnosis-related groups (DRG) and capitation. DRGs involve only one provider and pay a single fee for multiple services that are lumped together because they are related services (**FIGURE 3)**. Capitation is a payment system where service providers receive a payment for each patient they provide care to. The episode based bundled payment method hopes to minimize the financial risks that exist in capitation and DGR systems and sidestep negative impact on quality of care observable in those same systems. The proposed model of the new bundled payment systems finds a middle ground where payers and providers share financial risk through pre-negotiated contractual terms. The issue with capitation methods is that providers assume all of the financial risk. This risk culminates when the cost of patient care exceeds the amount the provider received for the specific patient being cared for. The services

included in a capitation payment are very broad due to the provider being compensated per patient for services rendered to that patient. In a DRG system the opposite is true, the payer or insurance company takes on the full extent of the financial risk. This is true because providers can control the diagnosis and complications or further illnesses of a specific patient will often become a new DRG claim since services included in DGR payments are very much limited. Capitation and DRG payments were designed and implemented for the purpose of achieving certain positive outcomes by implementing these initiatives in an attempt to control the amount spent on health care services. As time has passed since these payment methods were implemented other side effects have become apparent. Newer proposed bundled payment models like episode based models have become appealing because they are attempting to preserve the positive outcomes but allow improved flexibility between payers and providers to help mitigate financial risks. In some proposed models the savings or losses are shared by the provider and payer making the financial responsibility more equitable. This joint responsibility is expected to lead to a more careful use of services and an improvement in quality of care.

2.1 Law and Politics

The health care reform law has become a politically polarized issue with both sides trying to take credit for themselves but also discredit the opposing group. Democrats believe the work they are doing in Washington with health care reform is rooted in the Massachusetts model. The proposal is to increase taxes, give cuts for Medicare subscribers and implement price controls. The debate on health care reform has become a heated issue because politicians

have attempted to further polarize things. Conservatives like to focus on how the Massachusetts health care legislation is bankrupting the state. This is pointedly on the opposite end of the spectrum and is somewhat of an implausible claim since time will only tell how things will end up. With these political theatrics and extreme distortions of truth, it is important to set the record straight about the Massachusetts law. The success and failures of Massachusetts health care reform are critical to observe and learn from. Observations will create an in-depth comprehensive list of the lessons learned and help as determine how to improve health care country wide (Murphy, 2010). The focus of my research is on the impact of implementing a Bundled Payment System on controlling the rising cost of healthcare in the United States.

The state of Massachusetts has led the way in the health care reform arena through aggressively enacting new health care reform laws. Yet according to a Cato Institute policy report, the Massachusetts health care reform has failed on every level. The objective of the Massachusetts plan was to accomplish two important things: 1) achieve universal health insurance coverage and 2) control costs. Romney declared his reform law a triumph when he stated in the *Wall Street Journal*, "Every uninsured citizen in Massachusetts will soon have affordable health insurance and the costs of health care will be reduced." (Tanner, 2008). In reality Romney’s statement was premature because the plan although it has brought somewhat of a net positive, has accomplished neither of his claims. Literature shows that, the insurance mandate has not afforded universal insurance coverage to residents and the health care policy has overrun the budget by billions of dollars. The predominant thought is that Massachusetts

health care reform legislation has already cost resident taxpayers of the state a considerable amount of money. The cost of the plan has already exceeded projected costs. Originally the proposal estimated cost would be $1.8 billion in 2008 and it exceeded those estimates by $150 million (Tanner, 2008). This means that over the next 10 years the plan will be over budget by more than $2 billion. According to Tanner (2008), to add to the financial woes of the plan, Massachusetts could miss out on $100 million per year of Medicaid money because of a new federal rule. Massachusetts had planned to use this money to help finance the health care reform program. The Burden of this lost revenue stream could inevitably be put on Massachusetts taxpayers. Some are quick to criticize the Massachusetts law and declare it a failure while in truth we should not jump to early conclusions. Good policy is not politically charged it is carefully designed and well implemented. As negative outcomes arise a policy must be dynamic and able to address these problems. Still the issue will likely continue to be extremely polarized and opponents affirm their belief that there's a better approach than mandating coverage, providing subsidies and enacting regulations. They believe the answers to control of costs and increasing access to care lies in allowing consumers to have more control on spending. It is thought that this would increase competition in the market and help to drive cost down because consumers will be able to do their own bidding (Tanner, 2008). Critics believe the only lesson we should draw from the Massachusetts health care model is that it has failed in a financial sense and is specifically not successful in actually providing health care coverage to all.

3.2 Policy Goals of Adopting a Bundled Payment Model:

The goal of the policy is to lower the cost of health care while maintaining the level of access created by the mandate. Lowering cost means lowering prices on health care services, eliminating waste and making the health care system more efficient. By reducing cost through payment bundling, the long-term viability of the health care reform becomes more stable. The goal of the payment bundling policy is to eliminate services that are lower in value from the perspective of health outcomes. It also aims to eliminate services that are duplicative a common side effect of fee-for-services payment models. Additionally the bundled payment model strives to remove services that are unnecessary and wasteful. The model also penalizes providers with higher than average service costs and would reward providers with lower than average costs because they would be increasing their margins (Eibner et al., 2009). Secondly the policy would help to foster shared accountability in the patient health outcomes and encourage a greater coordination of care between providers across the complete delivery system (Eibner et al., 2009). Through these achievements it is expected that a reduction of health care expenditures will be realized and ultimately mean that a bundled payment model has made health care reform plans more financially feasible.

2.3 Advantages of the Bundled Payment Approach

There are advocates of the bundled payment approach to reeling in health care spending and they support it for several reasons. They believe bundled payments limit care given that may not actually be needed. By bundling payments proponents theorize that

providers will be encouraged to coordinate with each other and through this the care provided will likely improve in quality. They also believe that the bundled payment method is a better strategy than capitation because providers still have a financial incentive to give care to patients that are sickest.

Research has also shown that bundled or episode payments seems like the most practical and feasible approach for reducing health care spending. Mechanic and Altman (2009) analyzed several types of payment approaches and concluded that the bundled payment strategy is likely the best. They looked at the pros and cons of a global payment system in their analysis which is similar to a capitation model. Mechanic and Altman also examined pay for performance, fee-for-service, and bundled payment techniques in their analysis (Mechanic & Altman, 2009, p. 262-271).

In a Global payment arrangement a flat fee is received by the service provider in exchange for proving care for all hospitalizations for a specific amount of time (i.e. 1 year). This could be considered an improved form of payment because providers can receive bonuses by reaching certain levels of delivery of quality care. The Global payment concept makes the hospital assume most of the risk because the hospital must stay within budget no matter how many patients they admit and how expensive the care is (Bodenheimer & Grumbach, 2009, p. 40). This creates a problem where hospitals could presumably be denying care so they will not lose money (Berry, 2012). Bodenheimer and Grumback state that, global budgets are the most all-encompassing of strategies for bundling services of medical care. A fixed payment is made for all hospital services provided to every patient during 1 year ((Bodenheimer & Grumbach, 2009, p. 40)

Other research indicates specific savings by using the PROMETHEUS model which could equal a 5.4% reduction to national health care spending by the year 2019 (Hussey et al., 2009). PROMETHEUS is an acronym that stands for, Provider payment Reform for Outcomes, Margins, Evidence, Transparency Hassle-reduction, Excellence, Understandability and Sustainability (Health Care Incentives Improvement Institute, 2012). The model focuses on altering the way insurers and service providers handle payment transactions. It transforms the way business is conducted in order to achieve higher efficiency and higher cost effectiveness.

The PROMETHEUS Model focuses on rewarding providers for providing and coordinating efficient and high quality care that is patient centered. Research has found that of the seven aforementioned payment reform strategies studied, PROMETHEUS has the highest level of potential savings. Proponents also feel that all bundled payment methods, including PROMETHEUS, ultimately lower waste from overuse of services and minimize financial risk to consumers (Dong, Fitch, Pyenson, & Rains-McNally, 2011, p. 1&2).

2.4 Disadvantages of the Bundled Payment Approach

Opponents of the bundled payment approach believe that there is a lack of evidence it will indeed work. They argue there is minimal scientific evidence that supports the claim it creates positive outcomes and that most conclusions are usually considered uncertain (Dong et al., 2011, p. 2). The new bundled payment model being proposed is definitely in infancy yet the proposals idea is based in years of analysis of other types of bundled payment methods like

capitation and diagnosis-related groups. This proposed policy is not an original concept instead it is a refined concept of models that have had mixed success.

My focus with the bundled payment strategy centers on the PROMETHEUS Payment Model or PPM. In 2007 the Robert Wood Johnson Foundation (RWJF) provided the majority of the original support for the implementation of the PROMETHEUS Payment Model. This support came in the form of $6 million planning grant which spearheaded the creation and evaluation of the model. The grant extended over three years and enabled Health Care Incentive to start the program four pilot sites (Health Care Incentives Improvement Institute, 2012).

The PROMETHEUS concept is based on grouping compensation around an all-inclusive episode of medical care. The episode of medical care is defined as all care and services given to a patient for a specific clinically defined condition or illness. “Covered services are based on commonly accepted clinical guidelines or expert opinions that define the best methods for treating a given condition from beginning to end” (Health Care Incentives Improvement Institute, 2012, p. 3).

A patient specific budget called the Evidence Informed Case Rate (ECR) is created for the complete episode of care by calculating or predicting the cost of required treatments. By applying a budget to the process on a micro level, it affords a gauge for calculate the cost efficiency of the specific care that is provided. Evidence Informed Case Rates are designed to compensate for services regarding a single clinically established condition to all providers treating the patient. HCI also specifies that in order to find relevant costs for episodes the model separates out two types of risks, probability risks and technical risks. Probability risks are

the risks that are assumed by the insurer that are not within the control of the providers. Technical risks are risks assumed by the providers that are within the provider's control. Included in these risks assumed by the providers are the risks for Potentially Avoidable Complications or outcomes that may have been preventable with proper or better treatment (Health Care Incentives Improvement Institute, 2012, p. 3). "An example is when a patient with diabetes needs an amputation because of uncontrolled blood sugar … HCI has … found that up to 40 cents of each dollar spent on chronic conditions, and up to 20 cents of each dollar spent on acute hospitalizations and procedures, are because of PACs"(Health Care Incentives Improvement Institute, 2012, p. 3).

The Evidence Informed Case Rate represents the base payment for services to the specific patient for the episode of care. Depending on the quality of care administered, providers can earn additional compensation by reducing potentially avoidable complications. If complications and readmissions are avoided, the providers will collect all or some of the allocation for potentially avoidable complications as a bonus. This helps incentivize hospitals, physicians, pharmacies and all those included in providing the comprehensive care to deliver efficient yet high quality care. A quality scorecard is used to evaluate the care delivered which tracks the care and assesses it using a variety of metrics. The quality scorecard creates the final score based 70 percent on the primary provider performance and 30 percent on the performance of all other providers involved in delivering the care.

Critics also state specific drawbacks that might occur from using the new bundled method. One of which is that there is no disincentive to providing care that is unnecessary (Miller, 2009). They also believe that hospitals will tend to seek that which benefits them most and avoid providing care to patients that they presume they will not be adequately compensated for. They believe hospitals might be incentivized to exaggerate the extent of illnesses, provide the least amount of services possible, stall on diagnosis of complications until after the payment end date, and delay services for outpatient care (MEDPAC, 2008, p. 80-103). There are always loop holes in any system and a good policy is designed to address these possibilities. In this sense it is important to not let the pursuit of perfection to get in the way of progress. Implemented policies will never be perfect and must be able to respond to problems or negative outcomes as they arise.

2.5 Risk to The Patient Consumer:

It is argued that quality of health care could suffer due to hospitals minimizing the access patients have to seeking care from expensive specialists while they are in the hospital (Galewitz, 2009). This is only true if specialist care is actually required for the specific patient or episode. The fact remains that health care could likely become more efficient because of this same factor. When patients seek and receive specialist care that is actually not required it may likely significantly increase costs and could over burden the health care system. If available most people will seek multiple opinions and desire service from a specialist even if it is not

necessary for reaching a positive outcome. Until someone assumes a personal responsibility for the financial cost of these additional services a large amount of waste will occur in this regard. It is presumed that when a provider decides to have another provider issue partial care to a patient it will become challenging to establish how payments for the episode should be fairly distributed (Satin & Miles, 2009). With proper contractual rules and agreements this issue will be mitigated. The contractual agreements will not be based in negotiated rates for each episode because this method would be inefficient. There could be terms that are negotiable however these would be exceptions to the standard payment agreement practices.

It is true that illnesses don't always fit into neat little packages since quality care is often times dynamic when it responds to the unique set of circumstances of an individual patient (Commonwealth of Massachusetts [CWMA], 2009). For this reason, critics argue that it is quite likely patients could have several bundled episodes that overlap (Robinow, 2010). The objective behind bundling episodes is to minimize waste caused from overuse of health care services and maximize efficiency of the delivery of health care services. Bundled episodes will be established in a way that limits overlap of services delivered because overlap is costly, wasteful, and inefficient. The primary purpose of the bundled payment method is to minimize cost, maximize efficiency of care, and prevent overlap where separate providers deliver care that has already been performed by another provider. The basic premise of providing incentives through bonuses by reaching specific levels of quality is built into the model and will discourage overlap of care and promote quality care.

Medical services in the U.S. is considered to be on the forefront of development of new medical technology and advanced care. This is due in part to the investment made toward research and development efforts. Advancing medical care and developing new ways to treat illnesses is a primary focus of the medical system. Opponents of the bundled payment point out that our medical system depends on research and development and under a bundled system investments in research and development may become minimal. Many university hospitals have a strong focus on medical research, education, and innovation of new technology. It is possible these areas of the current medical industry will become less financially sustainable if compensation is done on a purely episode basis (Robinow, 2010). When providers are given a budget to operate on the revenue received may not be enough to rationalize investing money into new research and medical development. Implementing a bundled payment system could alter the health care industry's ability to continue aggressively advancing medicine.

Bundled payment strategies may not take into consideration all possibilities that can and will occur in the delivery of care. Opponents of bundling payments argue that the technique does not consider the possibility that severe medical events do occur. The Bundled payment method does not properly address how to pay for these unexpected extreme events. Under any bundled payment technique the financial risk for providers from severe events suffered by patients is large because they assume the risk that care will not exceed the specified clinical episode. It is possible this could create unease with in the medical provider community for accepting bundled payments instead of fees for services (Guterman, Davis, Schoenbaum, & Shih, 2009). Under the Fee-For Service system there is minimal risk to providers when the cost for care exceeds the original expected amount because they continue to receive compensation. In a bundled payment system the fees gathered are

limited by the amount allowable for specific episodes. If and when extreme medical events happen providers could lose a considerable amount of money because of costs running over the budgeted amount they have. This risk may not be something providers are willing to accept and may not support a bundled strategy because of this.

3 Methods and Data

I demonstrated a scenario where commercial and medical payers replace "fee-for-service" payments for bundled services payment. Certain high cost medical conditions such as congestive heart failure are commonly treated and can be defined into episode based bundles of services. This bundle of services concept will be used for the specific procedures and conditions included in the HCUP (**TABLE 1**). I also show how replacing the current Fee-for Service Payment System with a Bundled Payment System can help to lower national health care spending.

The value of bundles of services is defined according to the PROMETHEUS Payment Method. PROMETHEUS Payment is a system designed to help physicians and patients reach higher quality of care at a lower cost and to reduce incidents of complications of care. The PROMETHEUS Payment Method has cost estimates for four of the HCUP conditions and procedures. By modeling these bundling scenarios an understanding of the potential savings can be gained. To determine the net saving between bundled and non-bundled services, the cost of estimated bundled services will be subtracted from the Fee-for-Service costs (**FIGURE 4**).

3.1 Secondary Data Source 1: Healthcare Cost Utilization Project Data

The Healthcare Cost Utilization Project is a consortium of health care data bases providing not only data that's collected but also software tools and data analysis products. HCUP is a Federal,-State-Industry partnership that is sponsored by the Agency for Healthcare Research and Quality (AHRQ). HCUP has the largest collection of longitudinal hospital care data in the United States. This data and information spans back to 1988 and can allow researchers to study a broad range of health policy issues (HCUP Overview. Health Cost and Utilization Project, 2009). The data they have is on both the national, state, and local levels and covers health policy issues such as, quality of health services, medical practice patterns, access to health care programs, cost of health services, and outcomes of treatments. HCUP has several primary objectives as a government organization. These include creating a powerful source of national, state, and all-payer health care data, producing a broad set of software tools and products, enriching a collaborative partnership with statewide data organizations, and conducting and translating research to inform decision making and improve health care (HCUP Overview. Health Cost and Utilization Project, 2009).

The HCUP data used in this research paper (**TABLE 1**) was collected from a Nationwide Inpatient Sample (NIS) which was a national sample of over 1,000 hospitals. The sample contains data from 5 to 8 million hospital stays from these 1,000 hospitals and approximates a 20 percent stratified sample of U.S. community hospitals. The States participating in the HCUP sample account for 96 percent of the U.S. population. Samples were collected for years 1997, 2003 and 2009 and include data on the costs of acute care episodes. Acute care is a type of health care service that includes care for a patient that is short-term but for a severe episode of

illness or injury. The opposite of acute care is chronic care where a patient receives longer term care for a condition that is not as much of an urgent episode.

(**TABLE 1**) presents twenty acute care conditions with the highest cost in 2009 and these figures were adjusted for inflation and reported in 2009 dollars. In the report the U.S. Bureau of Economic Analysis Gross Domestic Product Price Index was used to eliminate variations from economy-wide inflation. However, hospital sector specific inflation was not removed from the calculations (Healthcare Cost Utilization Program, 2009).

The NIS data was compiled from discharge records for all inpatients treated in the 1,000 hospitals included in the sample. The discharges are weighted national estimates for the United States and represent stays in community hospitals across the nation (Healthcare Cost Utilization Program, 2009). The unit of analysis was the hospital stay rather than the patient. The data in (**TABLE 1)** represents the average cost per episode of acute care by hospital and was conducted this way to better attain a national aggregate cost. Hospital accounting Reports from the Centers for Medicare and Medicaid Services (CMS) were used to derive costs from the total hospital charges. Costs represent the total costs to deliver hospital services and were calculated using a hospital-wide cost-to-charge ratio (Healthcare Cost Utilization Program, 2009).

Several medical condition classification systems can be used to define inpatient hospitalizations. The Clinical Classifications Software (CCS) was used to determine and identify procedures and diagnoses (Healthcare Cost Utilization Program, 2009).

The hospitals included in this study were non-Federal hospitals that provide acute care services. The specific types of hospitals excluded were psychiatric and substance abuse

facilities, rehabilitation hospitals and Federal hospitals. All of the excluded hospitals either do not provide acute care or are not community hospitals.

In the HCUP study it was found that, growth in intensity of services accounted for, 72 percent of growth in the aggregate and population growth accounted for 27 percent of the total and an increase in the number of stays per population accounted for 1.2 percent of growth (Healthcare Cost Utilization Program, 2009).

3.2 Secondary Data Source 2: Health Care Incentives Improvement Institute (HCI)

The Health Care Incentives Improvement Institute (HCI) is a non-profit organization that is dedicated to measuring health care outcomes, reducing health care services defects, promoting collaboration between providers while caring for patients, realigning payment incentives around quality of care, and encouraging rewards for excellence in health care(Health Care Incentives Improvement Institute (HCI), 2012). HCI has developed and promoted several evidence-based incentive programs to help improve health care quality and value. One of the primary programs they developed is the PROMETHEUS Payment program. They are created this approach to focus on compensation that is based on medical episodes of care. HCI believes its PROMETHEUS model provides a fair and realistic design for health care payment reform (Health Care Incentives Improvement Institute (HCI), 2012).

The Potentially Avoidable Complications (PAC) estimates provided by HCI in (**TABLE 2)** have been tested and validated by several outside organizations. These specific organizations include RAND, Partners Health Care, Horizon Blue Cross Blue Shield, Wellpoint, HealthPartners and Aetna (**TABLE 4**) (("Reliability of PAC Measures," 2010)). HCI also thoroughly tested and

validated the PAC percentage results to make sure the analytical tool would produce the same results each time. When they ran tests the program returned the same PAC rate for any given Evidence-Case-Rate (ECR) with the database (("Reliability of PAC Measures," 2010)).

PACs calculations presented by HCI (**TABLE 2**) include measures of PACs that are widely used and have already been tested. The types of measures HCI used to calculate the PACs in the analytical tool they present were existing measures of ambulatory-care sensitive admissions, hospital-acquired conditions inpatient-based patient safety failures ("Reliability of PAC Measures," 2010). A Statistical Analysis System (SAS) program was used along with data from MASSPRO to create the HCI analytical tool called the Prometheus Engine. SAS is an integrated system of software product provided by SAS Institute Inc. capable of performing statistical analysis on data. MASSPRO is an organization dedicated to advancing health care quality, and claims to be one of the leading health care performance and improvement organizations in the United States (MASSPRO, n.d.). The MASSPRO vision is to “develop and disseminate innovative solutions that transform patient care” (MASSPRO, n.d.).

MASSPRO data was collected from a Commercially Insured Population and entered into a national development database. This data was collected from Health care providers with the hospital as the unit of analysis and is comprised of data of 4.7 million covered patients which encompassed $95 billion in claims costs ("Reliability of PAC Measures," 2010). HCI used this data along with the SAS software to construct the Evidence-Case-Rates and conduct regional cost analysis. MASSPRO and HCI were data partners in the development, testing and validation of the SAS packages created ("Reliability of PAC Measures," 2010). The SAS tool helped to create national benchmarks from MASSPRO data and other analyses and is the basis of ECRs in

the Prometheus model. By calculating the cost of required treatments these ECRs become the patient specific budget for a complete episode of care.

The Prometheus analytical tool resulting from MASSPRO and HCI intensive work has been used on over 20 claims databases including the Blue Health Intelligence database containing about 30 million patient members ("Reliability of PAC Measures," 2010). Part of the results generated from the Prometheus tool was a chart of the PAC rates of specific conditions across the claim databases analyzed of participating providers. The graph in (**FIGURE 5)** shows the percentage of patients with a PAC or PAC percentage for each condition studied. This PAC percent can be calculated into savings for the specific episode of care.

3.3 Use of Secondary Data Sources

Prior to being able to use the formula (**FIGURE 4**) designed to calculate the Estimated Bundled Cost, PAC percentage weights needed to be calculated for each episode of care. To find the PAC weights for each of the episodes in the HCUP data (**TABLE 3**) I first applied the national benchmark PAC percentages from this HCI table (**TABLE 2**). Four of the HCI episodes types matched with HCUP episodes they were “Liveborn”, “Diabetes”, “Pneumonia” and “Acute myocardial infarction”. Other episode types like “COPD” initially appeared to have matches in the HCUP and HCI tables however, closer inspection of the episode revealed they were not a perfect match. In these cases, the clinical definition of the episode of care was slightly different. Only the episodes that had indications the episode descriptions did not deviate were deemed a good match. In other words the close matches that had anything indicating differences in the level of services included were not considered a match.

After observing the PAC estimates and learning more about types of episodes of care and the potential savings attainable, I developed an assumption for how certain episodes could be weighted. The Idea I came up with is that the more expensive an episode of care is, the higher potential level of savings exists. The logic of this assumption is that when an episode of care is more expensive, preventing complications and readmission would save a higher percentage because providers would be preventing higher cost services. I used an ordinary linear regression to estimate the percentage of savings for each episode based on the sample of 4 episodes. I first ranked the HCUP episodes from lowest to highest cost, from 1 to 19. The overall costs of each episode was first calculated by averaging the cost data I had for 1997, 2003 and 2009 in the HCUP data which reports the Fee-For-Service cost of each episode. This was done to help even out the values and smooth out any uneven annual fluctuations of episode cost.

The linear regression graph that was generated (**FIGURE 6**) indicates that higher cost episodes could have a higher PAC percentage of savings. The x-axis shows the HCUP conditions ranked from lowest to highest and the y-axis shows the PAC savings percentages. I applied the calculated PAC percentages from the regression line to the HCUP episodes and calculated the PROMETHEUS savings in the two time periods (1997-2003 and 2003-2009) and built a trend line to project savings through year 2015 (**FIGURE 7**).

4.0 Results

The following is a summary of results of the potential savings attainable by utilizing a PROMETHEUS Payment model for specific acute care episodes. The acute care area of health

services is an area where the PROMETHEUS Model could be especially successful because research indicates within acute care there is a large amount of money spent on care for complications and readmission. The PROMETHEUS Model is designed to aggressively work to bring these types of costs down by implementing a budget and rewarding providers with an efficiency bonus.

On the weighted HCUP table (**TABLE 3**) the Fee-For-Service costs can be compared to the bundled payment costs and the totals can be seen at the bottom. In 1997 when we look at the total of all diagnosis we see that under the Fee-For-Service System cost for services provided was $107 billion and the estimate cost if the PROMETHEUS Payment Model were implemented could be about $93.76 billion. The difference between the two is $13.24 billion which would be the estimated savings that could have occurred in 1997 had the PROMETHEUS Model been employed. In 2003 the total FFS costs of services for these HCUP episodes was $149.7 billion and the estimated cost under a PPM would have been $131.16. The estimated savings during the year 2003 is $18.54 billion. 2009 was the third year reported in the HCUP data, in this year FFS costs were $169.60 while the estimated cost under a PPM was $148 billion. This calculates the estimated savings for 2009 as $21.60 billion for all HCUP episodes. I graphed these estimate savings from (**TABLE 3**) to verify the trend that could exist. The trend line from the plotted points was used to calculate the estimated savings value in 2015 (**FIGURE 7**). The formula for calculating the cost savings in 2015 was the following trend line is $y = 0.6968x + 13.058$. Using this formula I calculated the potential savings for each year between 1997 and 2015 and found a total estimated savings of $376.32 billion across the 19 year span. This savings estimate may seem like an excessive projection since savings in the billions of dollars is a large sum of money.

To put this in context the savings are actually fairly minor when considered as percentage of the overall health care costs under the Fee-For-Service System. Yearly savings percentages ranged from 12.37% to 13.40% of overall Fee-For-Service costs (**FIGURE 8**).

The magnitude of spending is put into context when a trend is calculated on Fee-For-Services costs (**FIGURE 9**). This trend graph helps with understanding the aggregate likely spending that may occur. When I analyze potential savings from utilization of the Prometheus Payment Model (**TABLE 5**), I found an average saving of one percent over the 19 year period. This is a very small amount of savings and challenges the claims presented by the promoters of the Prometheus strategy.

5 Discussion

The numbers that resulted from my analysis indicate there is an opportunity to attain a 12.85 percent total saving from implementing a Prometheus bundled payment reform model. This means that each year a Prometheus model was utilized savings would equal an average of 12.85 percent for the specific acute care episodes studied. Acute health care cost is a portion of the total cost of health care within the United States. The 12.85 percent savings rate cannot be extrapolated to other types of care (i.e. chronic care) but still only represents a portion of overall national health care costs.

The results of my analysis highlight how many gradual percentages of savings over an extended amount of time can add up to a large amounts of savings. By reporting an estimated savings of $376.32 billion dollars it may appear like the results are overstated however, the

average annual savings across these 19 years equals $19.81 billion. (**FIGURE 9**) shows the cost of care under a Fee-For-Service system and the linear trend of these costs for all episodes in the study for each year. The amount of annual spending for the acute care episodes in this study is shown to have doubled in the aggregate over the 19 year span.

The calculations showing an average of $19.81 billion dollars in savings per year for the studied acute care episodes, indicating there is real potential for savings through health care payment reform. If policy makers do not aggressively pursuing a bundled payment reform, my results show there could be a savings potential that will become a lost opportunity. If we chose to enact a Prometheus Payment Model as a reform measure, although it may not be a perfect model and may not save as much money as proponent's claim it will, it could help us-address the policy problem we face in the United States. Enacting a model like the Prometheus payment reform, could help to lower the cost of health care and could help make other health care policy goals more viable. If health care spending is controlled, policy makers could continue developing health care reform measures to address quality and access of health care. If payment reform is not addressed these other reform goals will suffer because in order to survive a policy or measure must be financially viable.

As mentioned in the HCUP methods this is predicted to be 72 percent due to growth in intensity of services, 27 percent due to growth in population, and 1.2 percent due to increased number of hospital stays. Population growth is obviously not controllable through payment reform measures but still, 73.2 percent of cost growth is something payment reform measures can have an effect on. The effect of population growth on PPM savings is shown in (**TABLE 6**)

where total actual savings equals $274.71 Billion over 19 years and average actual savings per year equals $14.46 Billion.

The results of this research suggest that implementing a Prometheus Model as a payment reform strategy could help to lower health care spending in both the short and long-term time frames. The assertion that large percentages of savings exist from utilization of a bundled payment reform measure may be over optimistic. Although there are calculable savings under a PPM System the reform may not achieve the expected level of savings proponents proclaim it will.

6 Conclusion:

The central concept of the PROMETHEUS Model is the idea of saving money by creating a budget for Potentially Avoidable Complications. The idea is that by creating this budget a better effort will be made to control spending excessive amounts of money on this aspect of health care. As it stands in a Fee-for-Service Payment System, providers have no financial incentive to prevent complications. Incentives to provide quality care may exist but stem from personal ethics and an individual providers desire to provide high quality care. The pressure to make a profit in many cases could persuade providers to not provide the care they would like to or the care they feel would be necessary.

The financial incentive in a Fee-for-Service System is to provide more care and not improved or higher quality care. A Fee-for-Service System has been called a structure that promotes volume driven care and not value driven care. Meaning that a higher volume of

services are delivered since there is a minimal disincentive to providing potentially unnecessary care and there is a lack of appropriate or quality care provided.

A provider could actually profit from complications arising in the patient's care that causes them to be readmitted. In this case the provider/s would be paid additional fees for the additional services stemming from the complications and remittance of the patient's condition. The core concept behind the PPM reform strategy is attractive because the strategy makes realization of savings seem easily attainable.

After studying the reform strategy in closer detail, it is evident that savings could be realized by utilizing the PPM reform however, the savings aren't as large as it initially might seem. Although potentially avoidable complications represent waste in terms of dollars spend on health care, it would be difficult to minimize these to a point that resulting savings would significantly address the policy issue. The claim by supporters of the Prometheus Model is that 30 percent of health care dollars are spent on PACs. This tends to overstate the potential for savings because only a portion of PACs will indeed be prevented through this or any other reform measure. This is not to say that we should not work to minimize PACs but that we should approach the issue with caution and not assume there is a potential for saving 30% of health care by implementing a payment reform like the Prometheus model.

6.1 Policy Implications:

Although savings are likely to be less than expected by proponents of the Prometheus payment model, they are still savings none the less. Sooner implementation of a bundled payment reform measure will help prevent lost opportunities for savings. The PPM reform

measure will assist in lowering health care as a percentage of GDP however it will not completely resolve the policy problem. There is an indication that savings can be realized through this reform and the savings could be reinvested into health care. There is a definite opportunity cost that exists in the possibility of reinvesting money saved back into the health care system and could be utilized for improving the quality of health care. By focusing on minimizing PACs the reform measure attacks the "low hanging fruit" or most likely area that cost savings can be made. The Potential for cost savings with PACs could likely help to lower the increasing costs of health care but will in no means eliminate the policy problem. When considering the risks to the patient consumer and the financial risks providers or physicians assume with cost overruns for severe medical episodes, it may be difficult to encourage support for this reform measure.

6.2 Limitations of the Analysis and Future Research:

The issue of health care payment reform has many variables involved because it is a dynamic issue. I worked to control the variable of population growth by utilizing existing analysis conducted In the HCUP study. Specifically in this study it was found that population growth accounted for 27 percent of the total growth seen between 1997 and 2009. By subtracting 27 percent out of the PPM Savings (**TABLE 6**), I was able to siphon out the actual saving that are not related to population growth. The actual total in (Table 6) represents increases in cost of the acute care episodes in the study attributed to a growth in intensity of services (72 percent of growth) and growth of the increase in number of stays per population (1.2 percent)(Healthcare Cost Utilization Program, 2009).

Although I worked to control for population growth as previously explained, it is difficult to control for all variables that have an impact on the potential savings from health care reform measures. For one, technological and medical advancements can add to the growing cost of health care and is difficult to distinguish what cost increases are attributed to. Costs increases like these are difficult to control for because it is complicated to measure them especially since the increases in cost could be spread within a specific episode of care or spread across many episodes of care. Other existing health care reform measures were also not controlled for. It is essential to carefully consider other health care reform measures and the effect they might have on the trajectory of the results.

It is also important to note that predicting values or trends past 2015 could go beyond the scope of the study because there is limited historical data (1997) and trend analysis would extend past the window of predictability if the trend calculations were conducted for 2016 or beyond. With 12 years of historical data it was decided that projecting the data an extra 6 years was the limit of the scope of this study because more years of data would be needed to compile a trend analysis for more years. Based on the secondary data sets used and the limited amount of historical data collection points in time (i.e. 1997, 2003 and 2009), I felt that six years was the full extent of trend projections permitted by these datasets past 2009.

Future research could help to overcome the limitations from not controlling for other existing health care reform measures and the lack of data constraining the trend analysis. Researching and understanding what else is occurring with health care payment reform would help to pin point how much of an effect other payment reform measures will have on the

Prometheus payment reform model. To gain a better understanding of the health care reform issue and extend the trend analysis beyond 2015, more historical data would be required. Having data for years prior to 1997 would help in the confidence in extended trend analysis. If we had data that extended back to 1987 we could rationalize conducting trend analysis through 2020 or 2022. More historical data allows for making better trend calculations from the data and more years of data allows for lengthier trend projections.

7 References:

Berry, E. (2012). Global Payment Gains Traction in Massachusetts. Retrieved from http://www.ama-assn.org/amednews/2012/02/06/bise0208.htm

Bodenheimer, T. S., & Grumbach, K. (2009). *Understanding Health Policy* (Fifth ed.). Chicago: McGraw-Hill Companies, Inc.

Commonwealth of Massachusetts. (2009). *Recommendations of the Special Commission on the Health Care Payment System* (NA). Washington, DC: U.S. Government Printing Office.

Comprehensive Assessment of Reform Efforts. (2010). Retrieved from http://www.randcompare.org/policy-options/bundled-payment.

Cromwell, J., & Dayhoff, D. A. (1998). *Medicare Participating Heart Bypass Demonstration* [Report]. Baltimore, MD.: Centers for Medicare and Medicaid Services.

Data on the Individual Mandate [Key Findings Document]. (2008). Retrieved from Massachusetts Health Connector and Department of Revenue: http://www.mass.gov/dor/docs/dor/news/pressreleases/2010/2008-final-report.pdf

De Brantes, F., Rosenthal, M. B., & Painter, M. (2009, Sept 10). Building a Bridge from Fragmentation to Accountability - The Prometheus Payment Model [Supplemental]. *New England Journal of Medicine*, *361;11*, 1033-1036. Retrieved from http://www.nejm.org/doi/full/10.1056/NEJMp0906121

Division of Health Care Finance and Policy. (Cartographer). (2011). Bundled Payments vs Fee-for-Service: Concept [Diagram]. Retrieved from

http://www.mass.gov/eohhs/gov/newsroom/hcf/events/bundled-payment-symposium.html

Dong, L., Fitch, K., Pyenson, B., & Rains-McNally, K. (2011, December). *Evaluating bundled payment contracting* [Briefing Paper]. Retrieved from Milliman: http://publications.milliman.com/publications/healthreform/pdfs/evaluating-bundled-payment-contracting.pdf

Eibner, C. E., Hussey, P. S., Ridgely, M. S., & McGlynn, E. A. (2009). *Controlling Health Care Spending in Massachusetts: An Analysis Of Options*. Retrieved from RAND Corporation: http://www.rand.org/content/dam/rand/pubs/technical_reports/2009/RAND_TR733.pdf

Galewitz, P. (2009). Can bundled payments help slash health costs? Retrieved from http://www.usatoday.com/news/health/2009-10-25-bundled-payments_N.htm

Guterman, S., Davis, K., Schoenbaum, S., & Shih, A. (2009, Feb). Using Medicare payment policy to transform the health system: a framework for improving performance. *Health Affairs*, *28-2*(), 238. doi:10.1377/hlthaff.28.2.w238

HCUP Overview. Health Cost and Utilization Project. (2009). http://www.hcup-us.ahrq.gov/overview.jsp

Health Care Incentives Improvement Institute. (2012). http://www.hci3.org/what_is_prometheus

Health Care Incentives Improvement Institute. (2012). http://www.hci3.org/what_is_prometheus/framework

Health Care Incentives Improvement Institute (HCI). (2012). http://www.hci3.org/about_hci3

Healthcare Cost Utilization Program. (2009). http://hcup-us.ahrq.gov/reports/factsandfigures/2009/highlights.jsp

Hussey, P. S., Eibner, C., Ridgely, M. S., & McGlynn, E. A. (2009). Controlling U.S. health care spending - separating promisinf from unpromising approaches. *New England Journal of Med*, *22*, 2109-11. doi:PMID 19907037

Liu, C. F., Subramanian, S., & Cromwell, J. (2001). Impact of Global Bundled Payments on Hospital Costs of Coronary Atery Bypass Grafting. *Health Care Finance*, 39-54. Retrieved from

MASSPRO. (n.d.). http://www.masspro.org/about/index.php

MEDPAC. (2008). *A path to Bundled payment around a hospitalization*. Retrieved from post-acute.org: http://post-acute.org/bundling/MedPAC%20Report%20on%20bundling,%20June%202008.pdf

Massachusetts Division of Health Care Finance Policy [Final Report]. (2009, June 19). Retrieved from mass.gov: http://www.mass.gov/eohhs/docs/dhcfp/pc/final-report/final-report.pdf

Mechanic, R. E., & Altman, S. H. (2009). Payment Reform Options: Episode Payments is a Good Place to Start. Retrieved from http://healthaffairs.or/cgi/content/full/28/2/w262.

Miller, H. D. (2009). From volume to value: better ways to pay for Health Care. Retrieved from http://healthaff.highwire.org/cgi/content/full/28/5/1418

Murphy, T. (2010, March). The Truth About Massachusetts Health Care Reform [Editorial]. *Politico LLC*.

Must Control Health Care Spending [Report]. (2011, November 9). Retrieved from Boston.com: http://www.boston.com/news/local/massachusetts/articles/2011/11/09/report_mass_must_control_health_care_spending/

Reliability of Prometheus PAC (Potentially Avoidable Complications) Measures. (2010). Retrieved from http://www.hci3.org/sites/default/files/files/Reliability%20of%20Prometheus%20Measures.pdf

Report to Congress: Promoting Greater Efficiency in Medicare [Report]. (2008). Washington, D.C.: Medicare Payment Advisory Commission.

Robinow, A. (2010). The potential of global payment: insights from the field. Retrieved from http://www.commonwealthfund.org/~/media/files/publications/fund%20report/2010/feb/1371_robinow_potential_global_payment.pdf

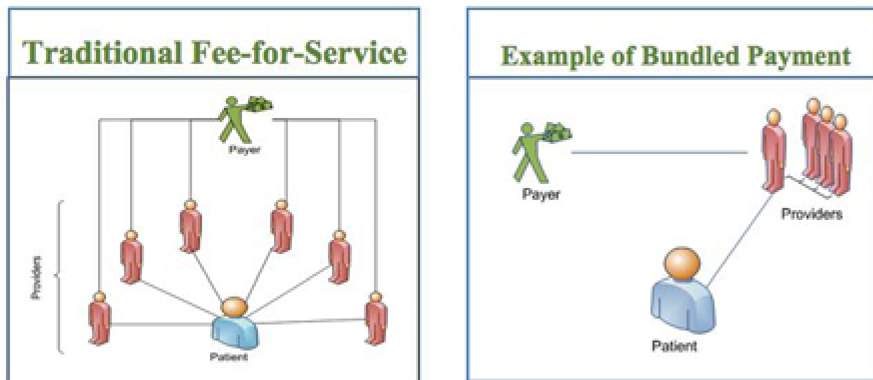
Satin, D. J., & Miles, J. (2009). Performance-based bundled payments: potential benefits and burdens. Retrieved from http://www.minnesotamedicine.com/pastissues/october2009/specialreport2009/tabid/3209/default.aspx

Shoen, C., Guterman, S., Shih, A., Lau, J., Kasimow, S., Gauthier, A., & Davis, K. (2007, December 18). Bending the Curve: Options for Achieving Savings and Improving Value in U.S. Health Spending. *Common Wealth Fund*, *80*(), 89. Retrieved from http://www.commonwealthfund.org/Publications/Fund-Reports/2007/Dec/Bending-the-Curve--Options-for-Achieving-Savings-and-Improving-Value-in-U-S--Health-Spending.aspx

Tanner, M. (2008). Lessons from the Fall of Romney Care. Retrieved from

http://www.cato.org/pubs/policy_report/v30n1/cpr30n1-1.html

Figure 1: Bundled Payment vs Fee-for-Service Payment



(Division of Health Care Finance and Policy [DHCFP], 2011, p. 12

Figure 2: Capitation Diagram PG 10

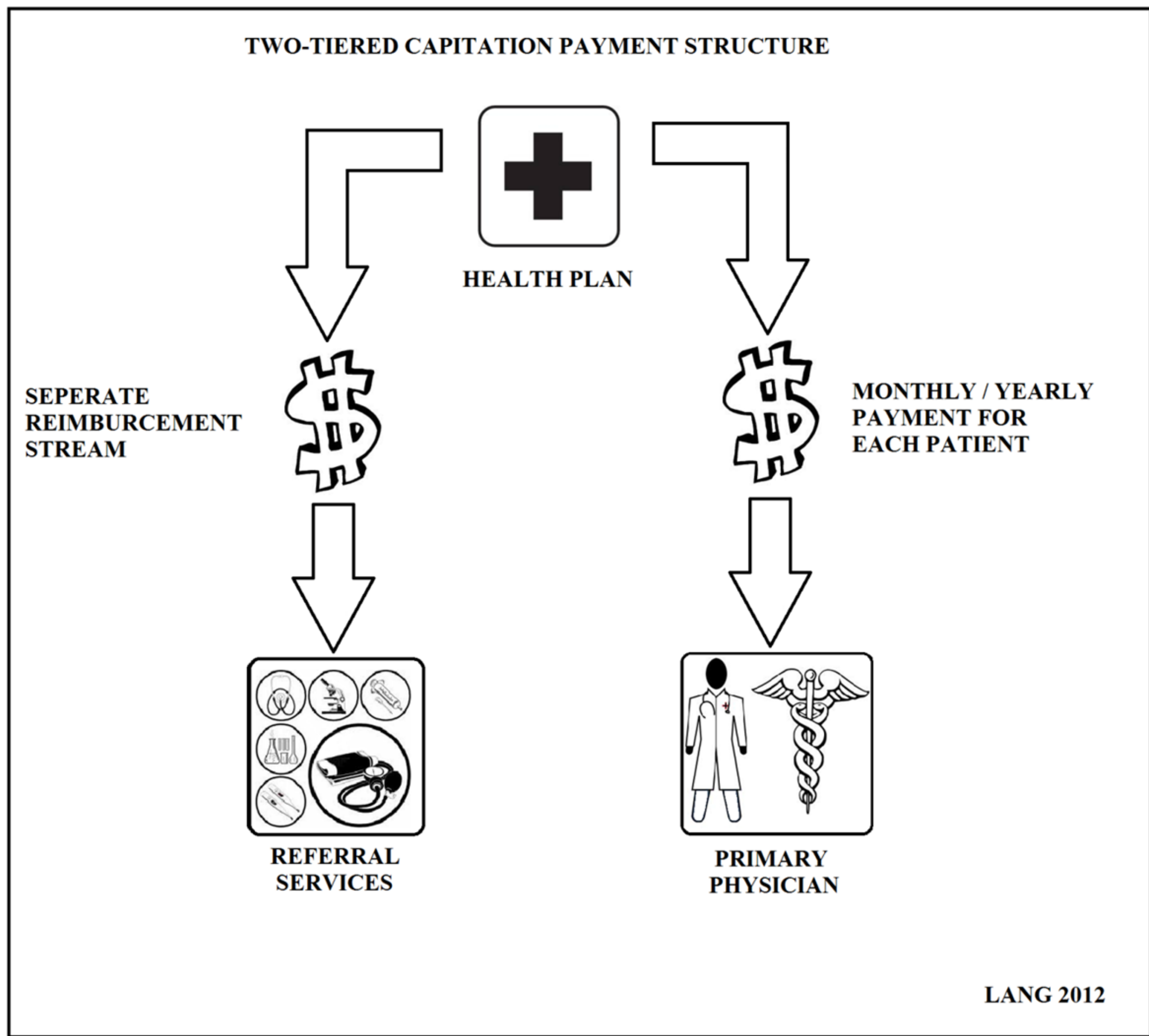


Figure 3: Diagnosis-Related Groups (DRG) Diagram PG 10

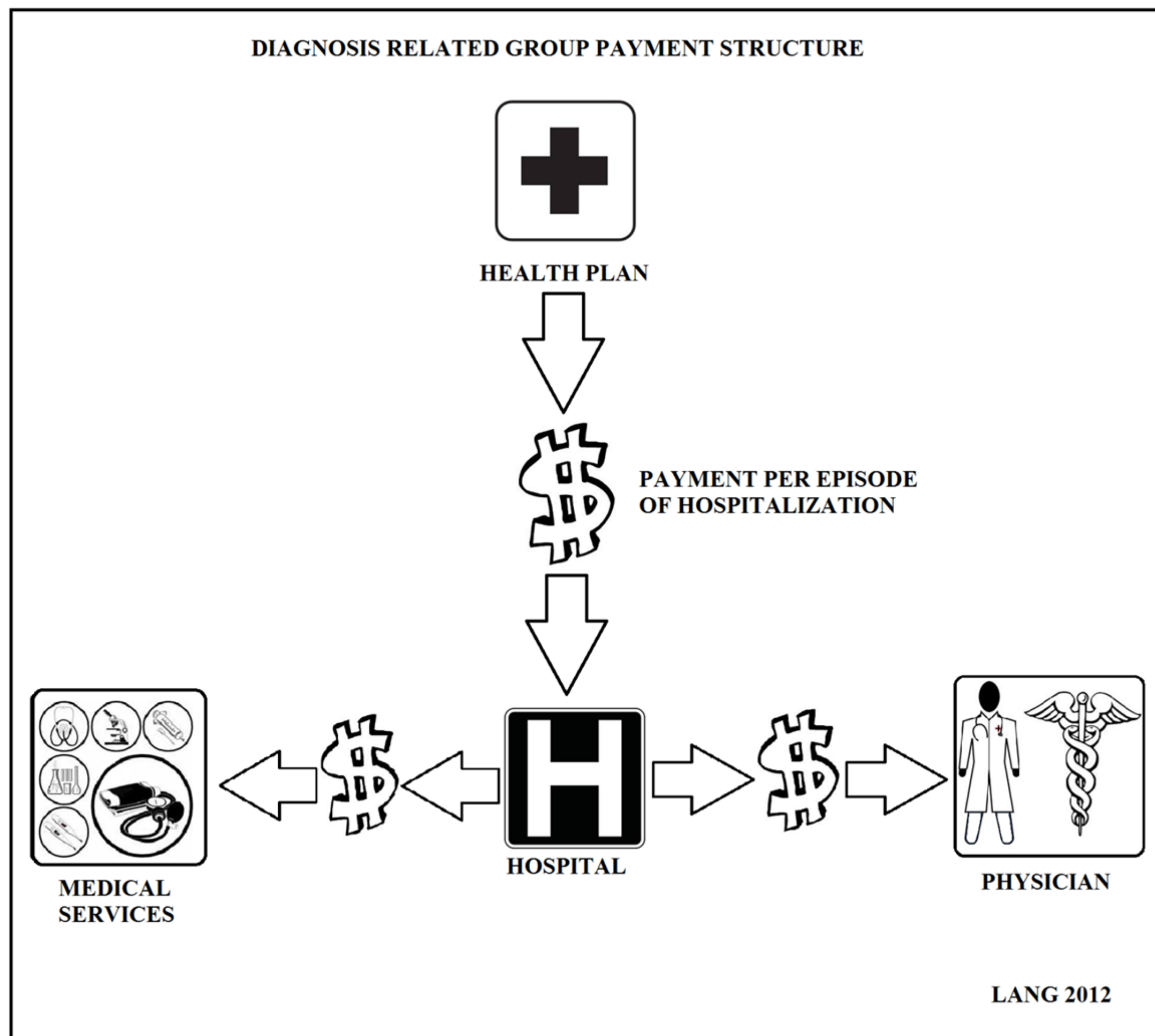


Figure 4: Estimated Bundled Cost Formula

Estimated Bundled Savings Formula

Equation 1: The formula for Estimated Bundled Cost is:

Y = EBC(x)

Y = (PAC weight (x)) x (Episode FFS Cost(x))

Equation 2: The formula for the Fee-For-Service cost is:

Y = FFSC(x)

EBC = Estimated Bundled Cost

PAC Weight = Potentially Avoidable Complications

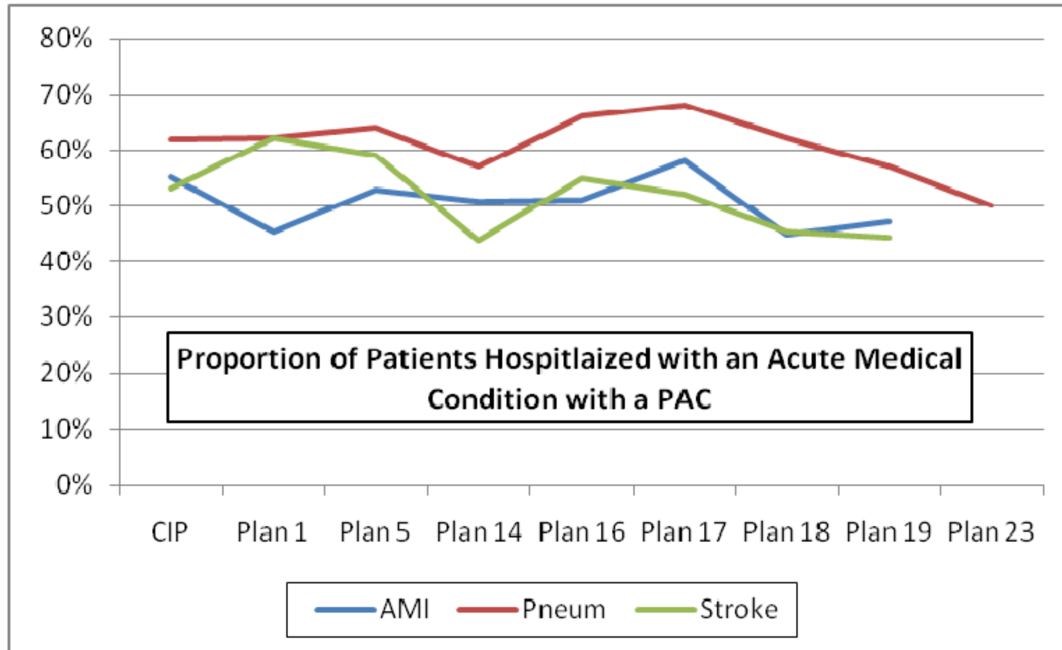
FFSC = Fee for Services Cost

Equation 3: The Estimated Bundled Savings Formula:

EBS(x) = [FFS(x)-EBC(x)]

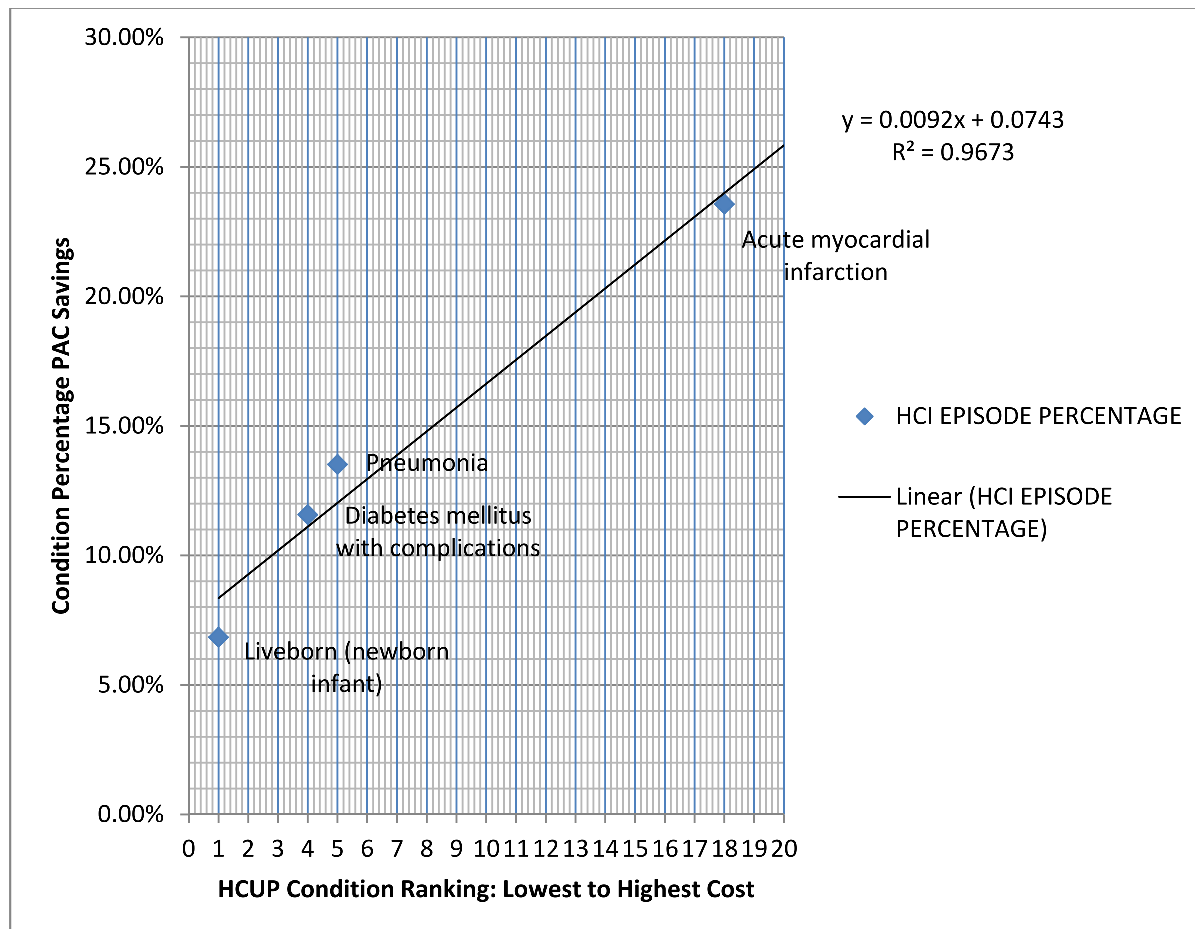
LANG 2012

Figure 5: Patient PAC percent - acute medical conditions



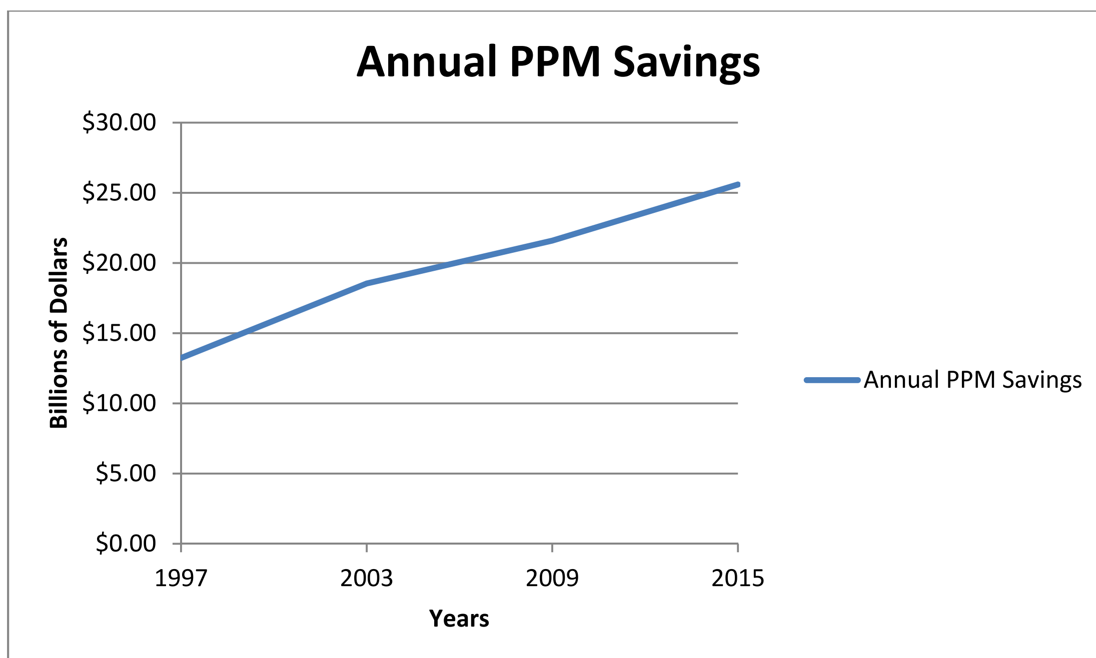
("Reliability of PAC Measures," 2010)

Figure 6: Linear Regression Graph



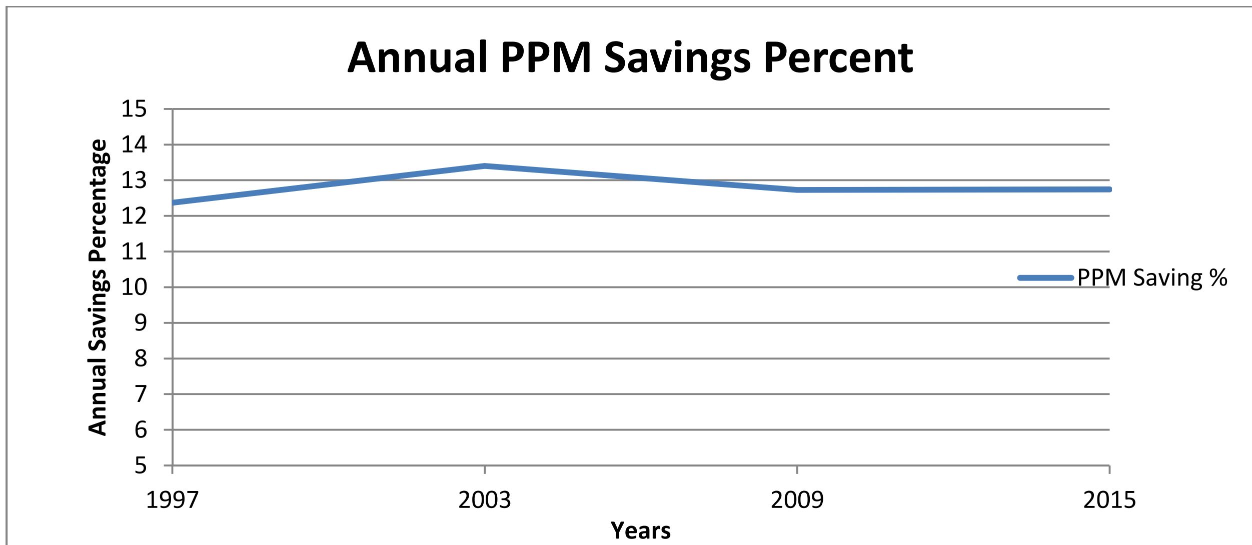
LANG 2012

Figure 7: HCUP Episodes: Annual Savings From PROMETHEUS Payment Model



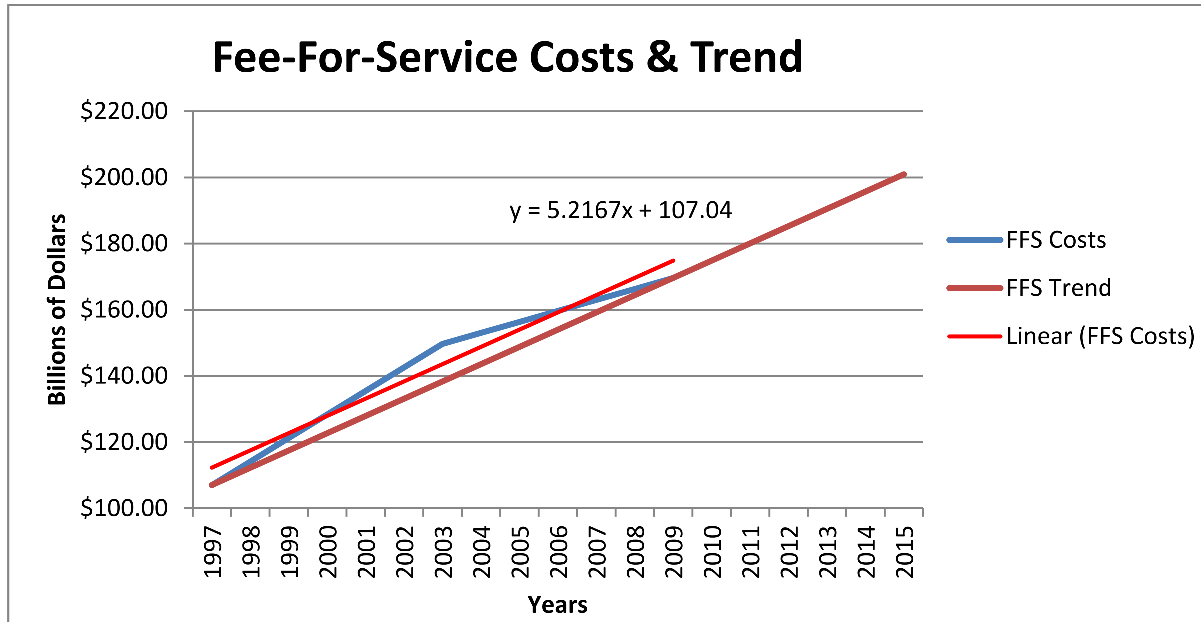
PPM: Prometheus Payment Model LANG 2012

Figure 8: Annual PPM Savings Percentage



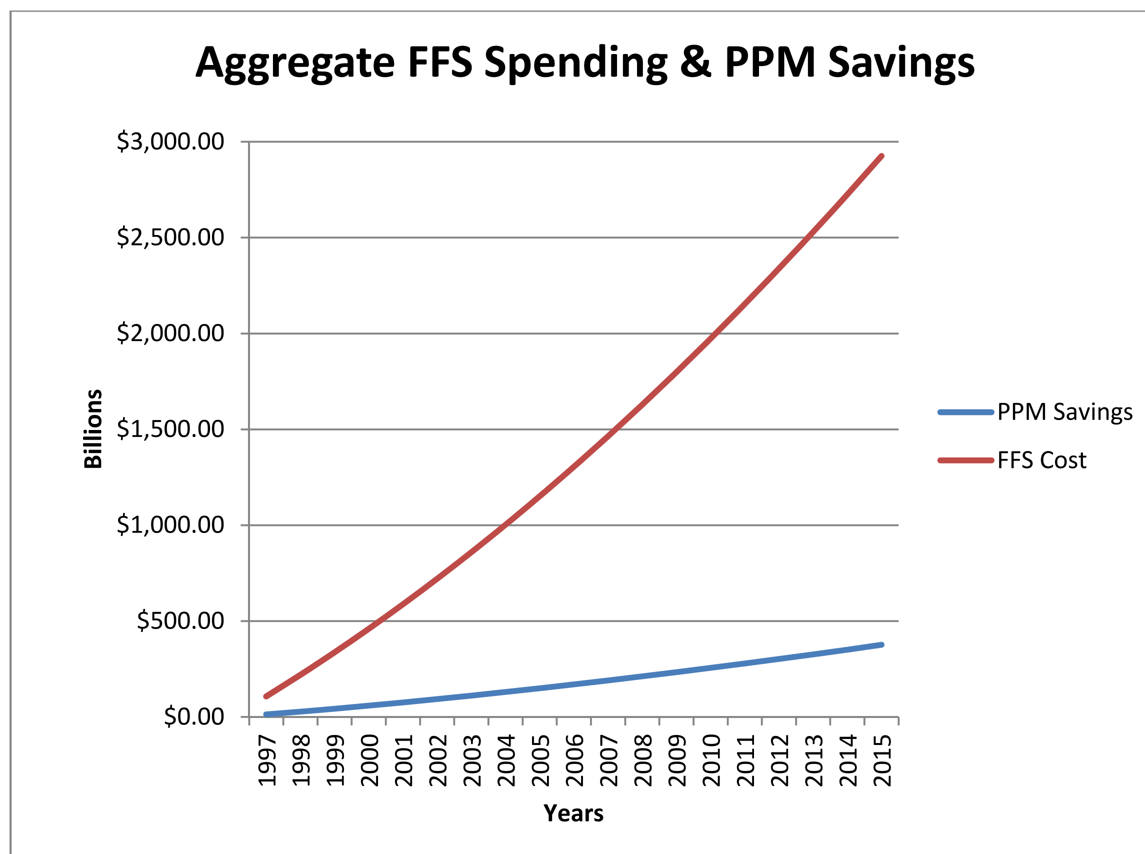
LANG 2012

Figure 9: Yearly Fee-For-Service Cost and Trends in Billions



LANG 2012

Figure 10: Aggregate FFS Cost & PPM Savings



PPM: Prometheus Payment Model LANG 2012

FFS: Fee-For Service

Table 1: HCUP: Annual PPM Savings Percentage

Aggregate Costs for Hospital Stays by Principal Diagnosis, 1997, 2003, and 2009						
	ADJUSTED† HOSPITAL COSTS IN BILLIONS: 2009			COST PER STAY		
PRINCIPAL CCS DIAGNOSIS	1997	2003	2009	1997	2003	2009
All diagnoses	$229.60	$324.30	$361.50	$6,600	$8,500	$9,200
Septicemia	$4.30	$5.70	$15.40	$10,300	$14,800	$18,500
Osteoarthritis	$4.90	$8.20	$13.60	$11,800	$14,000	$14,800
Coronary atherosclerosis	$15.30	$18.20	$13.40	$10,900	$14,500	$16,100
Liveborn (newborn infant)	$8.30	$10.70	$11.60	$2,200	$2,600	$2,800
Acute myocardial infarction	$9.60	$13.10	$11.50	$13,100	$17,500	$18,200
Complication of device, implant or graft	$5.80	$9.50	$11.40	$11,800	$16,000	$17,000
Congestive heart failure	$7.00	$11.40	$10.70	$7,000	$10,200	$10,400
Pneumonia	$9.30	$11.50	$10.50	$7,600	$8,800	$9,000
Spondylosis, intervertebral disc disorders, and other back problems	$3.60	$7.10	$9.90	$6,700	$10,900	$15,100
Respiratory failure	$3.50	$5.30	$8.10	$17,400	$22,000	$21,400
Cardiac dysrhythmias	$3.70	$6.90	$7.50	$6,500	$9,800	$9,300
Acute cerebrovascular disease	$5.70	$7.00	$7.40	$9,200	$12,500	$13,400
Complication of surgical procedures or medical care	$3.00	$5.10	$6.10	$8,600	$11,200	$11,800
Chronic obstructive pulmonary disease and bronchiectasis	$3.50	$4.60	$5.40	$6,300	$7,400	$7,400
Biliary tract disease	$3.50	$4.60	$4.80	$7,600	$10,000	$10,100
Rehabilitation care, fitting of prostheses, and adjustment of devices	$3.90	$4.90	$4.80	$10,000	$10,700	$11,800
Diabetes mellitus with complications	$2.90	$4.30	$4.60	$7,000	$8,900	$8,700
Fracture of neck of femur (hip)	$3.30	$4.00	$4.40	$10,100	$13,000	$14,300
Mood disorders	$3.30	$4.20	$4.30	$5,100	$5,200	$4,900
Heart valve disorders	$2.60	$3.40	$4.20	$27,200	$35,400	$36,700

(Healthcare Cost Utilization Program, 2009)

Table 2: HCI PMPM Calculator and Data

Savings Opportunity Analysis by ECR		
ECR Clinical Area	Condition	PAC%
DM	Diabetes	11.57%
CAD	Coronary Artery Disease	22.78%
CABG	Coronary Artery Bypass Graft Surgery	35.23%
GERD	Gastro-esophageal Reflux Disease	45.03%
COPD	Chronic Obstructive Pulmonary Disease	32.97%
PREG	Low Risk Pregnancy	6.84%
CHF	Congestive Heart Failure	11.11%
ASTHMA	Asthma	14.39%
COLOS	Colonoscopy	18.84%
AMI	Acute Myocardial Infarction	23.56%
PCI	Percutaneous Coronary Intervention	16.87%
KNRP	Knee Replacement	7.34%
HTN	Hypertension	14.39%
COLON	Colon Resection	11.70%
KNEE	Knee Arthroscopy	4.59%
BARI	Bariatric Surgery	60.66%
GALL	Gall Bladder	11.84%
HIPR	Hip Replacement	50.45%
HYST	Hysterectomy	15.66%
PNE	Pneumonia	13.51%
STR	Stroke	43.41%
Total Savings Opportunity as a % of Relevant Costs1:		16.82%

(Health Care Incentives Improvement Institute (HCI), 2012)

Table 3: Weighted HCUP data table

TOTAL INFLATION-ADJUSTED† HOSPITAL COSTS IN BILLIONS: 2009 DOLLARS							
		FFS	FFS	FFS	PMPM	PMPM	PMPM
Weight	Episode	1997	2003	2009	1997	2003	2009
0.9665	Liveborn (newborn infant)	$8.30	$10.70	$11.60	$8.02	$10.34	$11.21
0.9573	Mood disorders	$3.30	$4.20	$4.30	$3.16	$4.02	$4.12
0.9481	COPD and bronchiectasis	$3.50	$4.60	$5.40	$3.32	$4.36	$5.12
0.9389	Diabetes mellitus with complications	$2.90	$4.30	$4.60	$2.72	$4.04	$4.32
0.9297	Pneumonia	$9.30	$11.50	$10.50	$8.65	$10.69	$9.76
0.9205	Cardiac dysrhythmias	$3.70	$6.90	$7.50	$3.41	$6.35	$6.90
0.9113	Congestive heart failure	$7.00	$11.40	$10.70	$6.38	$10.39	$9.75
0.9021	Biliary tract disease	$3.50	$4.60	$4.80	$3.16	$4.15	$4.33
0.8929	Complication of surgical procedures/care	$3.00	$5.10	$6.10	$2.68	$4.55	$5.45
0.8837	Rehabilitation care, fitting of prostheses	$3.90	$4.90	$4.80	$3.45	$4.33	$4.24
0.8745	Spondylosis, disc disorders & back problems	$3.60	$7.10	$9.90	$3.15	$6.21	$8.66
0.8653	Acute cerebrovascular disease	$5.70	$7.00	$7.40	$4.93	$6.06	$6.40
0.8561	Fracture of neck of femur (hip)	$3.30	$4.00	$4.40	$2.83	$3.42	$3.77
0.8469	Osteoarthritis	$4.90	$8.20	$13.60	$4.15	$6.94	$11.52
0.8377	Coronary atherosclerosis	$15.30	$18.20	$13.40	$12.82	$15.25	$11.23
0.8285	Septicemia	$4.30	$5.70	$15.40	$3.56	$4.72	$12.76
0.8193	Complication of device, implant or graft	$5.80	$9.50	$11.40	$4.75	$7.78	$9.34
0.8101	Acute myocardial infarction	$9.60	$13.10	$11.50	$7.78	$10.61	$9.32
0.8009	Respiratory failure	$3.50	$5.30	$8.10	$2.80	$4.24	$6.49
0.7917	Heart valve disorders	$2.60	$3.40	$4.20	$2.06	$2.69	$3.33
All Diagnosis		$107.00	$149.70	$169.60	$93.76	$131.16	$148.00

LANG 2012

Table 4: Organizations that have used, tested and validated HCI PAC analytical packages

Organizations that have used, tested & validated the HCI - SAS analytic packages - PAC analysis
BCBSA (Blue Health Intelligence) Anthem WellPoint
Blue Cross Horizon Aetna
BCBS Michigan Priority Health, Michigan
BCBSNC/ BCBSSC Medica, MN
BCBS Tennessee Health Partners, MN
BCBS Texas Maine Health Information Center (MHIC)
Horizon Blue Cross Blue Shield New Jersey New York- CDPHP
Care First New York- MVP
Cigna New York - HNA (Health Now)
IBX (Independent Blue Cross) / Crozer-Keystone Utah's Public Employee Health Plan (PEHP)
Pennsylvania Employees Benefit Trust Fund (PEBTF) Regence Health Plan, Utah
Partners Healthcare, MA CO San Luis Valley
Tufts Health Plan, MA Wellstar
Harvard Business School General Electric
Harvard School of Public Health ECOH (Employer Coalition on Health, Rockford IL)
RAND Watson Wyatt
IPRO Ingenix (UHG)
Stat Works Giesinger Health Systems
Discern Consulting Navigant Consulting
MassPRO: CIP* (Developmental Database) MedAssets: Prometheus Engine
Other Interested Organizations
Providence, Portland Colorado Health Foundation
MMIA (Montana Municipal Inter-local Authority) CalPERS, California
US Oncology Society Wisconsin Collaborative
*CIP: Commercially Insured Population – this was our national developmental database with 4.7 million lives and $95 billion in claim costs that formed the basis of ECR construction as well as the regional MassPRO was our data partner where the SAS programs were developed, tested and validated.

("Reliability of PAC Measures," 2010, p. 3)

Table 5: Calculations of Trend Savings Percent

Year	X-Value	PPM Savings	FFS	Saving %		FFS Cost Trend	TS % *
1997	0	$13.24	$107.00	12.37288		$107.04	
1998	1	$14.12	$114.12			$112.26	
1999	2	$15.01	$121.23			$117.47	
2000	3	$15.89	$128.35			$122.69	
2001	4	$16.77	$135.47			$127.91	
2002	5	$17.65	$142.58			$133.12	
2003	6	$18.54	$149.70	12.38345	7.116667	$138.34	
2004	7	$19.05	$153.02			$143.56	
2005	8	$19.56	$156.33			$148.77	
2006	9	$20.07	$159.65			$153.99	
2007	10	$20.58	$162.97			$159.21	
2008	11	$21.09	$166.28			$164.42	
2009	12	$21.60	$169.60	12.73606	3.316667	$169.64	
2010	13	$22.12				$174.86	
2011	14	$22.81				$180.07	
2012	15	$23.51				$185.29	
2013	16	$24.21				$190.51	
2014	17	$24.90				$195.72	
2015	18	$25.60				$200.94	
Total		$376.32				$2,925.82	12.86%
Average		$19.81				$153.99	12.86%

PPM: Prometheus Payment Model
FFS: Fee-For-Services
*TS %: Trend Savings Percentage

Lang 2012

Table 6: Aggregate PPM Savings & FFS Costs Controlled for Population Growth

Year	PPM Savings	FFS Cost Trend
1997-2015 Sub Total	$376.32	$2,925.82
Pop Growth	$101.61	$789.97
Actual Total	$274.71	$2,135.85
Average Actual Total	$14.46	$112.41

PPM: Prometheus Payment Model
FFS: Fee-For-Services Lang 2012