

Working Paper Series

**Working Hard or Hardly
Working? The Effects of Pay
Structure on Cost of
Healthcare Provision**

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Abstract

With the cost of healthcare rising in the United States, policy makers and hospital management are trying to find ways to reduce costs associated with the provision and consumption of healthcare. One way to maintain costs within the hospital is examining physician pay. Financial incentives drive physician behavior and can affect the cost of care provided. Specifically, research has been done on the effects and differences between fee-for-service and the capitation method. The research found that different pay structure has different effects on physician behavior and implications on the cost of care given. However, there is a lack of empirical evidence on physicians with no prior exposure to either compensation method. This thesis intends to investigate how costs are affected by fee-for-service and the capitation method on medical students. It addresses the lack of research on the effects of different pay structures on physicians with no prior experience with pay structure. A survey given to medical students at the University of Minnesota evaluated the effects of different pay structures on the cost of care given. Results showed that the pay structure given to the participant significantly influenced the participant's decisions in choosing a treatment option. Specifically, participants under capitation significantly preferred the lower cost treatment relative to participants under FFS, who preferred the higher cost treatment. The behaviors of medical students coincide with the hypothesized behaviors under each pay structure.

Key words: pay structure, compensation, reimbursement, physicians, healthcare, cost

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1. Introduction

The growth in healthcare costs in the United States is unsustainable. Total healthcare expenditure in 2011 was 17.9% of Gross Domestic Product (Wayne 2012). Wayne projects that health care spending could reach 20% of GDP by 2021. Lowry (2012) states that, “The medical system wastes an estimated \$750 billion a year while failing to deliver top reliable, top-notch care” (p. A22). Lowry proceeds to say, of the money wasted, “\$210 billion [was] spent on unnecessary services, like repeated tests.” As a result, healthcare policy and the economics of healthcare have been tirelessly debated on how to reduce costs. This has put pressure on the hospitals to find ways to lower costs while still maintaining the necessary quality within the industry.

One approach taken to reduce costs is to reevaluate the pay structure and incentives given to physicians. Giordano (2012) using data from the Bureau of Labor Statistics, announced that doctors and surgeons were America’s highest paying jobs in 2012. The average annual salary for doctors and surgeons ranged from \$168,650-\$234,950 (Giordano 2012). Second to doctors are dentists and orthodontists, \$161,750-\$204,670 (2012). With the rising cost of healthcare, a point of scrutiny might be the compensation given to healthcare providers.

There is a general consensus that a relationship between pay and productivity in any industry exists. Tomar (2011) summarizes that using performance-related pay fosters healthy competition and helps employees perform better. In addition, Lazear (2000) has shown that pay for performance (P4P) affects worker productivity. P4P in this case means pay based on productivity or, in Lazear’s study, how many glass installations you perform. An implementation of P4P showed an increase in the number of glass installations on cars (2000). Studies have tried to

understand how pay structures can affect the quality and cost of care given by physicians, even though healthcare is a unique service industry.

Fee-For-Service (FFS) and the capitation method are two pay structures that are frequently compared in research. FFS compensates physicians for every service they provide. For example, a surgeon would be compensated for providing a patient with a coronary artery bypass. The amount compensated would be pre-determined by a standard rate from third party payers like Medicare. Each service provided is linked with a code that allows physicians to bill third party payers the specific code, or service, they provided. The capitation method compensates physicians for providing care to patients over a period of time. For a single patient, physicians would be compensated a certain amount of money for providing care to a patient regardless of services provided. This sum of money is based on various factors such as location, age, patient history etc.

Past research shows that these two pay structures have different effects on physician behavior. In general, a physician's choices and behavior are aimed at increasing personal benefits, in terms of monetary compensation, regardless of costs imposed on the system. The term *system* means the interaction between physician, patient, hospital and payer.

There is limited research that has been conducted on new physicians that have yet to be exposed to a particular pay structure. In addition, the research conducted compares both pay structures together, rather than in isolation from one another. When comparing two different pay structures, consecutively, the difference is elevated in comparison from a physician with no prior experience. Physicians with a previous pay structures may be biased or disagree with the new structure and act irrationally toward making a decision.

This thesis aims to understand and evaluate the effects of FFS and the capitation method on physician behavior and the monetary costs of care provided. In other words, the main question posed is, how does pay structures affect physician behavior and how does this affect the cost on the system? Furthermore, I propose that costs on the system will be higher for physicians under a FFS structure rather than the capitation method. Surveys were administered to medical students in attempt to understand how their decisions are affected under certain guidelines and incentives. Through this mechanism, I evaluate whether there is a statistically significant cost difference on the system between the two pay structures.

This thesis contributes original research by not only understanding how these two different pay structures can affect the cost of care to the system, but how it affects physician behavior with limited exposure to pay structure. Medical students have little experience with pay structures. This population of future physicians will give insight into how pay structures can affect physicians with limited exposure to pay structures. Therefore, this “clean” population will provide a clearer insight into the effect of pay structure on physician behavior.

This Thesis is organized into 5 additional sections. In Section 2, there is an in-depth literature review of current research that relates to different pay structures and their effects on patient and physician behavior in different medical disciplines and specialties. There is also a discussion of the current gap in literature. In section 3, the methodology of research to answer the proposed question is discussed. In section 4, the results of the study described are reported. In section 5, the analysis of the results and implications for future research will be discussed. Finally, in section 6, conclusions are discussed.

2. Literature Review

There are numerous studies in the literature that focus on the effects of different pay structures on physician behavior and the implications of cost on the system. Many studies compare the effects of the two methods mentioned in the introduction, FFS and capitation. The studies observe the abrupt change in pay structure from one method to another and how this affects physician behavior.

The first section of this literature review will review the effects of pay structure on patient behavior and qualitative care factors. The second section considers the effects of capitation on physician behavior and overall care given. Many of the studies cited compare both pay structure methods against one another their outcomes will be discussed. The third section will analyze the limitations of these studies and attempt to describe how this study will contribute to this gap in literature.

2.1 Pay Structure and Patient Base Behavior

During the mid-2000's, Canada underwent a primary care reform in which physicians and patients had the opportunity to choose between the capitation method and an enhanced FFS. Glazier et al. (2009) conducted a population based study to understand how physicians and patients chose between the two systems and their effects on the provision of healthcare. Glazier et al. (2009) discovered that there were more patients enrolled under physicians that were compensated by capitation. In addition, under capitation, a higher proportion of the patients sought emergency department (ED) visits rather than office visits. The patients tended to have less morbidity, comorbidities and fewer chronic conditions in comparison to the patients under physicians paid by FFS (2009).

This study demonstrates a few key points. First, the payment structure had an effect on the demographic base in terms of amount and characteristics. There was a tendency of patients with less chance of illness to choose physicians paid under capitation. Intuitively this is simple; physicians that are compensated to provide care to patient over a fixed time will enroll patients that are expected to need less care. Second, under capitation, a higher proportion of patients received care in ED visits rather than office visits. This may be due to patients choosing not to obtain care unless necessary. From this study by Glazier et al. (2009), it is clear that pay structure has an effect on preferences of patient population and the type of care given.

Even though this study provides significant results, there are a few considerations that must be kept in mind. First, the study simply shows the characteristics of the physicians, patients and delivery of care under each method. The study does not delve into how these methods affected the quality of care provided or the costs associated with the provision of care. This is due to the limited administrative data. Second, there is no clear analysis as to why there were a higher proportion of patients under capitation utilized ED visits in relation to office visits. Glazier et al (2009) suggest, “This was a pre-existing pattern of use and not a result of the conversion to the capitation model. The capitation model appears to have attracted physicians with certain practice styles and patient populations” (E78). It would seem that the use of ED is not a result of a change to capitation, but rather Populations that tend to use ED visits more often, were more likely to choose the capitation model.

2.2 Pay Structure and Physician Behavior

After understanding the effects of pay structure on patient populations within these groups and behavior, another layer can be revealed. That is, how these two pay structures can

affect physician behavior and consequently the cost of care on the system? To highlight the main points, Shrank et al. (2005) showed pay structures can affect the amount of care given, Tickle et al. (2011) showed that pay structures can incentivize physicians to move towards lower cost treatments, and Quast et al. (2008) showed that the focus of physicians can differ based on pay structure.

Shrank et al. (2005) examined how physician reimbursement methods can affect the rate and cost of cataract care. Shrank et al. focused on the transition of payment structures from FFS to capitation during 1997 and 1998. Shrank et al. (2005) observed costs, rates, and level of reimbursement for cataract surgeries. They discovered that the number of cataract procedures were reduced by half after capitation was introduced. In addition, since the number of procedures was reduced, the facility fees (e.g. room time fees, electricity etc.) were reduced by 45% (2005). This decreased the overall costs of procedures.

From Shrank et al. (2005), under capitation, physicians are incentivized to provide fewer services, which can decrease overall cost for the system. There are some limitations that must be considered. First, the study only focused on one procedure, a cataract surgery, an elective surgery. While conclusions and assumptions can be made about other elective procedures under capitation, other services in other specialty areas may not show the same results. Another limitation is the short time frame under which the study was conducted. Six month time-frames may not adequately characterize the effects of a change in pay structure, although the results were dramatic.

Another study, conducted by Tickle et al. (2011), displays similar results. In this case, many services were affected by the introduction of a new pay structure to compensate physicians. There were reductions in treatments that cost more to dentists in favor of treatments

that cost less (2011). Tickle et al (2011) discovered that there was an abrupt change in treatment rates in numerous interventions (crowns, extractions, bridges etc.) after the new dental contract was introduced. There were significant decreases in interventions that were associated with higher costs and longer treatment times. However, there was an increased rate of interventions that were associated with lower costs and shorter treatment times.

Due to the financial incentives, dentists preferred providing certain treatments rather than another. Tickle et al showed that dentists, healthcare providers can be incentivized to provide dramatically different rates of treatments based on the financial incentives involved regardless of clinical factors.

Furthermore, a study conducted by Quast et al. (2008) sought to understand the variation in care given in managed care organizations between FFS and capitation. Quast et al. (2008) found that under a FFS, the visit rate was higher and that the compliance rate of following best practices was lower compared to a capitated system. Their summarized finding is that under fee for service, preventative care was provided more frequently to increase revenue. On the other hand, under a capitated system, care to reduce visits was the main focus.

This study was limited in terms of geographical reach, limited to one state, and time, limited to one year. These limitations reduce the robustness of generalizations that can be made. Furthermore, no explicit conclusions were made on the effects of pay structure on cost. Rather, implicit conclusions are made about how cost is affected.

Overall, financial incentives play a factor on patient and physician behavior regardless of specialty or area of healthcare. Different pay structures can change the rates of treatment given, the cost of care given, costs imposed on the system and patient-base characteristics. In general, physicians compensated under FFS provide more care, whereas, physicians compensated under a

capitation method provide less care. Furthermore, capitation has shown to reduce costs to the system, whereas FFS disregards cost in favor of productivity, or providing more care to increase revenue.

2.3 Limitations

The studies outlined have similar characteristics. This lack of diversity in characteristics leaves gaps in the literature. For example, many studies examine the change in physician behavior from an original state of compensation to a new state of compensation. The studies followed and observed an evolution or abrupt change to the pay structure of physicians. These studies do not observe these methods in isolation, or independent of one another. In addition, physicians in the study have experience with previous payments. These studies do not observe how pay structure can affect the behavior of a physician with limited experience in compensation. Since physicians have prior experience with pay structures, this can introduce bias. The bias is also introduced because the studies discussed observe the whole sample. They do not randomly select a group within the sample.

My research addresses both these gaps in literature. By surveying medical students, future physicians with little compensation experience, in healthcare, we will be able to observe how physician behavior will be affected having limited exposure to pay structures. The medical students are a “clean” group. Furthermore, each medical student will only be given one pay structure to base their treatment decisions. This will allow us to observe how two pay structures can differ in isolation of one another. Rather than seeing a before and after state, we will see how the pay structures motivate physician behavior independently and if there is a significant difference in treatment choice. In addition, the random assignment of participants into each

method will show a more direct effect of payment structure on costs. There is a reduced problem of selection bias that will affect the choices of the participants. The next section outlines the methodology of how I propose to answer the research question.

3. Methodology

From section 2, it is evident that different pay structures affect physician behavior. To determine how medical student's decisions towards treatments are affected by varying pay structures, I developed a survey tool to collect the data. The goal of the survey is to determine whether or not different pay structures, FFS and capitation, affect the decisions of physicians in choosing two different treatment options. The two treatments differ in cost and their choices will give insight into how pay structures affect the cost on the system. Part two obtains data about preferences and opinions about pay structure and compensation. The survey will be explained in greater detail in section 3.2.

This section will outline my hypotheses, the measurements, and the analysis of the data. A discussion of the methodology will conclude this section.

3.1 Hypothesis Statements

As stated in section 1, there are two main types of pay structure methods for physicians, FFS and capitation. These two pay structures are expected to have different effects on physician behavior. This research attempts to understand how these pay structures affect physician behavior and their effects on the cost of care to the system.

As stated in section 1, FFS compensates physicians for every service they provide. In the United States, individual procedures are assigned a unique code. For example, a preventative

checkup for a patient between years 5-11 would be assigned a code 99393. These individual codes have a reimbursement rate associated with them that are paid to the physician after they provide the service.

Under FFS, physicians are incentivized to provide more care. More care includes, but is not limited to, more procedures, more prescriptions, or more tests. Under FFS, the more care that is provided the more revenue a physician earns. In other words, the more productive a physician is the more revenue he/she generates. This can lead physicians to provide unnecessary care. Consequently, this has impacts on the cost of care on the system. The more revenue the physician makes, the higher the costs of care for the system. The more procedures, tests, prescriptions etc. the higher the revenue the physician will make.

Furthermore, physicians are incentivized to provide care that not only benefits their patient but also themselves. If given the option between two treatment options that differed in the revenue generated for the physician, the physician will likely choose the option that would generate more revenue. There is no structure in place that would discourage the physician to not provide the service that generates more revenue. They have no incentive to consider the cost on the system. Thus, physicians are incentivized to increase the costs to the system for their own personal gain. Based on these observations, it leads me to my first hypothesis:

H₁: Medical Students incentivized under FFS will prefer the treatment with higher costs (treatment 2) relative to capitation.

Hypothesis 1, in general terms, states that medical students will choose treatments that will earn them higher revenue regardless of the cost imposed on the system.

As stated in section 1, under capitation, physicians are compensated for providing care to a single patient over a fixed period of time, regardless of the amount of services they provide.

For example, a physician will be paid a lump sum for providing services to a 65-year old female patient over a 3 month period. The compensation is calculated based on factors such as age, sex, location, pre-existing conditions etc. to normalize these differences for hospitals.

Under capitation, physicians are incentivized to provide only the necessary services to the patient. Physicians are given a fixed amount of revenue for providing services to a patient. The more services physicians provide the individual patient, the higher the cost to that physician which leads to smaller profits. Conversely, less care given leads to higher profits for the physician because of smaller costs. The cost and quantity of care are a larger factor for the physician. Based on these observations, it leads me to my second hypothesis:

H₂: Medical Students incentivized under capitation will prefer the treatment with lower costs (treatment 1) relative to FFS.

Hypothesis 2, in general terms, states that medical students will choose treatments that will earn them higher profit, understanding that revenue is fixed and wary of the costs imposed on themselves and the system.

3.2 Data and Measures

To obtain the necessary data, I developed a survey tool aimed at medical students from the University of Minnesota Medical School. Medical students were contacted through an email from the president of Student National Medical Association. Since many medical students have limited exposure to pay structures, the survey primes the participants by defining the two pay structures. Then, the survey places the participants into one of two groups, randomly. One group is incentivized under FFS and the other group is incentivized under the capitation method. Under

FFS, they are reimbursed a cost-plus rate of 6%. Under capitation, they are given \$4000 for all the services they will provide over three months.

They are given a simple case and a choice of two different treatment options. The case involves a 65-year old male with no previous health complications and no family history of disease. He is diagnosed with prostate cancer and the best treatment plan is a chemotherapy regimen. There are two treatment plans/drugs that the medical students have the option of using. There is no difference in side effects and the efficacy rates are the same. The two treatments only differ in the cost of the treatment. Treatment 1 drug is Taxotere®. The wholesale cost is \$100 per drug treatment. Treatment 2 drug is Jevtana®. The wholesale cost is \$500 per drug treatment. Based on the pay structure, they are asked about their preferences for each treatment and which treatment they would choose. The next section asks participants their opinion about the two different pay structures and compensation. All questions are answered using a Likert scale from one to seven (strongly disagree to strongly agree). The survey can be referenced in the appendix.

3.3 Data Analysis

To evaluate the two hypotheses, the primary tool used was a multivariate regression. The dependent variables were the preference for each treatment plan. These preferences are determined by a 7-point Likert scale (strongly disagree to strongly agree). The primary independent variable was the payment structure each participant was given (Capitation versus FFS), which is captured by the dummy variable *Capitation* in the regressions below. Capitation is coded 1, and FFS is coded 0. Other control variables include the participant's undergraduate major, intended specialty, gender, age, and year in medical school. The regression models I used to analyze my hypothesis are the following:

$$1: \text{Preference for Treatment 2} = \beta_0 + \beta_1(\text{Capitation}) + \beta_2(\text{Age}) + \beta_3(\text{Gender}) + \beta_4(\text{Specialty}) \\ + \beta_5(\text{Major}) + \beta_6(\text{Year}) + \varepsilon$$

$$2: \text{Preference for Treatment 1} = \beta_0 + \beta_1(\text{Capitation}) + \beta_2(\text{Age}) + \beta_3(\text{Gender}) + \beta_4(\text{Specialty}) \\ + \beta_5(\text{Major}) + \beta_6(\text{Year}) + \varepsilon$$

For model 1, if $\beta_1 < 0$ and significant, that would mean that there is a negative and statistically significant linear relationship between the capitation method and preference for treatment plan 2. It would show support for Hypothesis 1 that participants under FFS, relative to capitation, will prefer treatment plan 2.

For model 2, if $\beta_1 > 0$ and significant, that would mean that there is a positive and statistically significant linear relationship between the capitation method and the greater preference for treatment plan 1. It would show support for Hypothesis 2 that participants under the capitation method are more likely to prefer treatment plan 1.

Using multivariate regressions as the primary analytical approach will allow me to analyze the effect of the payment structure on medical student's decision-making while controlling for other variables that may affect treatment choices, including age, gender, major and specialty. In the next subsection, I will discuss the appropriateness of my methodology.

3.4 Appropriateness of Methodology

The use of a survey for data collection is an appropriate approach to answer the aforementioned research question. The scenario and treatment options focus on how pay structure can affect physician behavior and its subsequent effect on cost of care given. Many outside factors are controlled to allow cost and pay structure to play the main role within the decision making. In addition, using a regression model allows me to correlate the effects of the

pay structure on the preference for treatment options, while controlling for other factors. This will allow me to make inferences on the cost of care given.

The survey was designed to take no more than five to seven minutes. This is a purposeful decision to reach the intended population. This is a strength of the survey design that increases the willingness of participants to take the survey.

Although this methodology is appropriate for the research question, there are assumptions and limitations that must be discussed.

First, since the scenario controls for many outside factors, there is a limitation to the survey. In the healthcare environment, there are many other factors that can affect the diagnosis and treatment of a patient. For example, the patient history, the efficacy of certain treatments, insurance policies, or other factors can play a role in the diagnosis and treatment of a patient. In addition, in some scenarios, there may be only one reasonable treatment or several treatment options. In these situations, cost may take lower priority to these other factors. The survey does not address these factors, instead it controls for them. Although, the survey does not appropriately imitate the actual environment in which physicians operate, which reduces the generalizability of the study, the theoretical scenario allows a more direct correlation between pay structure and physician behavior.

Next, the survey design does not take into account the long-term quantity of care given. The survey only accounts for one patient visit. It does not consider the effects over a period of time. No attempt was made to observe how the pay structure could affect a physician's behavior over a course of time and the difference in quantity of care provided. As stated earlier, this difference in quantity of care can affect the cost on the system. Even so, a single decision that is changed by pay structure can drive similar behavior in the future. Therefore, conclusions made

about a physician's single decision can provide a basis of inferences into their decision patterns in the future. In addition, like other studies, this study focuses on only one disease state in which the scenario is simplified for the medical student to choose between two prescription drugs. As stated earlier, decision making for physicians in different specialties can be complex and unique.

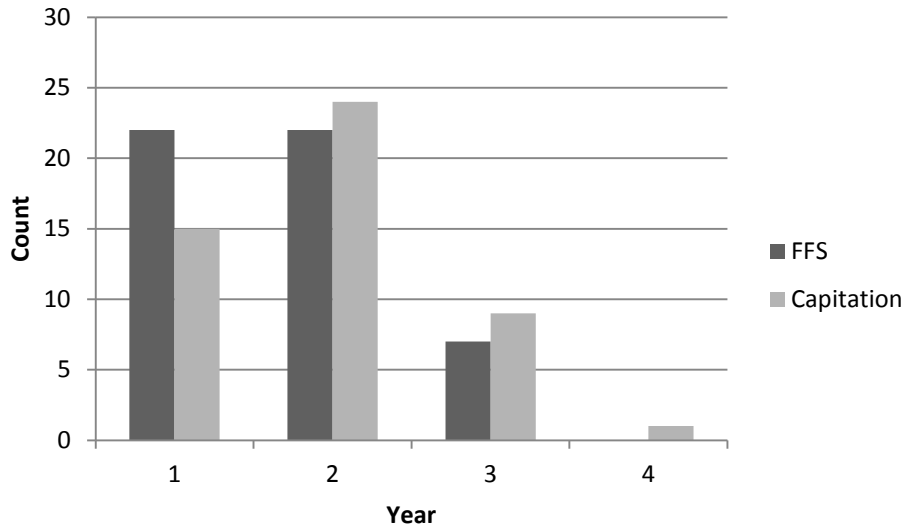
Another assumption is that the opinions, decisions and perspectives of medical students are generalizable to physicians. Medical students are future physicians, which I believe is an appropriate population to gain insight into the decision-making process of physicians. Medical students have more to learn about the medical field. Their limited exposure to pay structures will help to understand how these pay structures affect a clean population. It gives an unbiased result because there is little to no preconceived views or opinions about either pay structure.

Finally, although the survey is strategically short in length, the shortfall is that it does not allow for more meaningful data collection. Specifically, more medical student opinions and perspectives on pay structures. Even so, the main data needed was obtained with a high response.

4. Results

To analyze the effects of pay structure on physician behavior and the cost of care given, I first analyzed the medical student demographic to understand the sample population (N=100). Figure 1 shows the year in medical school participants were in at the time of taking the survey based on which pay structure group they were randomly assigned in.

Figure 1: Participant's Year in Medical School Based on Pay Structure Group



From a simple analysis of figure 1, there is not a large difference in either pay structure group based on year in medical school. In addition, there was no difference in the male to female ratio in either group (33% male in FFS and 34% male in capitation). These analyses show a brief indication for no difference between the two groups tested. In addition, a chi-square test of independence based on gender, showed support that the two variables were independent at the 10% significance level. To clarify, these measures and variables are all controlled for in the regression model.

Next, the medical student's preference for each treatment under either pay structure was obtained. Figure 2 shows the preference for treatment 1, the lower cost treatment, for participants incentivized under each method. From a preliminary analysis, there is a higher agreement in preference for treatment plan 1 from participants under capitation in comparison to FFS. For participants under FFS, irrespective of capitation, there is high agreement in preference for treatment 1.

Figure 2: Participants Preference for Prescribing Treatment 1 (Low Cost)

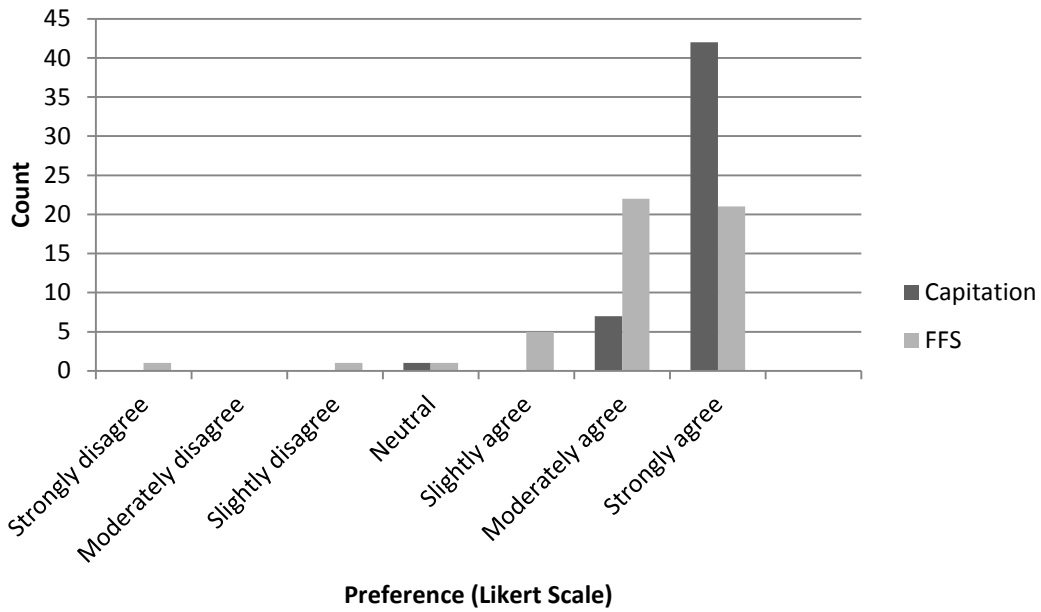
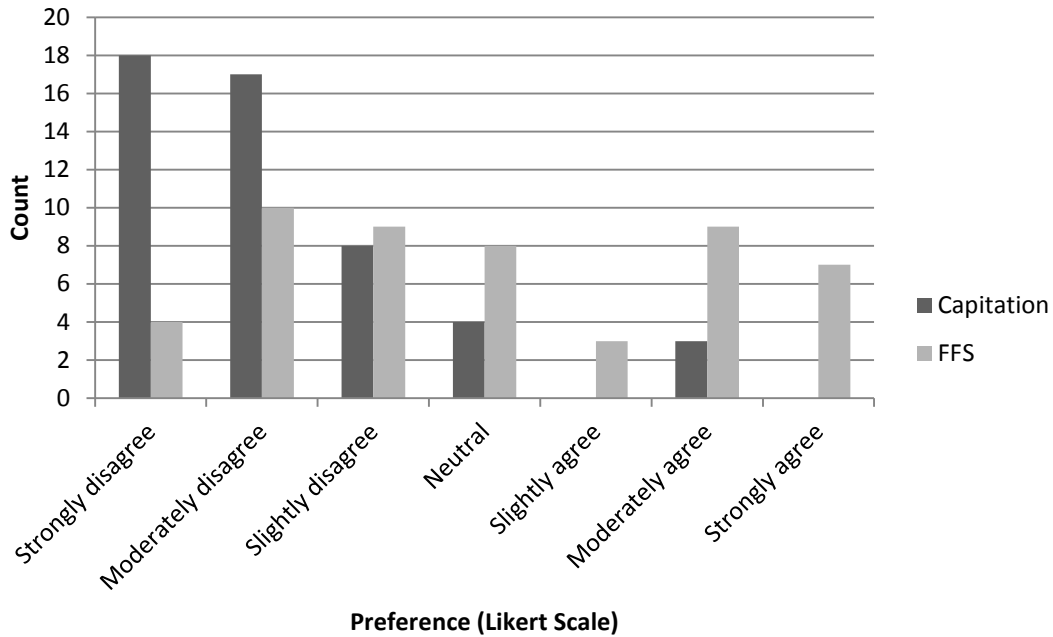


Figure 3 shows the preference for treatment 2, the higher cost treatment, for participants incentivized under either method. The results look much more varied and unrelated. There is a strong preference for disagreement with participants under capitation. The range of preference for participants under FFS is much wider. There is no clear trend toward agreement or disagreement for treatment 2, but rather balanced throughout.

Figure 3: Participants Preference for Prescribing Treatment 2 (High Cost)



Overall, for both pay structures, there is a strong positive preference for treatment plan 1. But there is a more varied preference for treatment plan 2 for FFS participants in comparison to capitation which showed a strong disagreement for treatment plan 2.

To understand to what extent the pay structure played a role in determining physician behavior, the regression models were utilized. This will help understand if any of the other variables played a significant role in determining treatment plan preferences. Figure 4 shows the results of the regression models. To clarify, the results from Figure 2 and Figure 3, preference for each treatment using a Likert scale, were used to measure the dependent variables in the regression models.

Figure 4: Results of linear regression of independent variables

	Treatment 1		Treatment 2	
Intercept	4.872	***	7.910	***
Capitation	0.692	***	-1.819	***
CONTROLS				
Year	-0.020		0.200	
Male	-0.137		-0.197	
Biochemistry	-0.007		0.266	
Biology	-0.121		0.107	
Chemistry	0.228		-0.518	
Neuro Science	-0.059		-1.036	
Biomed Eng.	-0.022		-0.316	
Double Major	0.344		-0.879	*
Age	0.060		-0.166	*
Surgery	-0.182		-0.240	
Gen. Medicine	-0.379		0.497	
OBGYN	-0.128		0.441	
pediatrics	-0.004		0.061	
Emergency	-0.134		-1.200	
Other	-0.566	*	0.600	
R-Square	<u>0.204</u>		<u>0.346</u>	

*Significant at the .10 level **Significant at the .05 level ***Significant at the .001 level

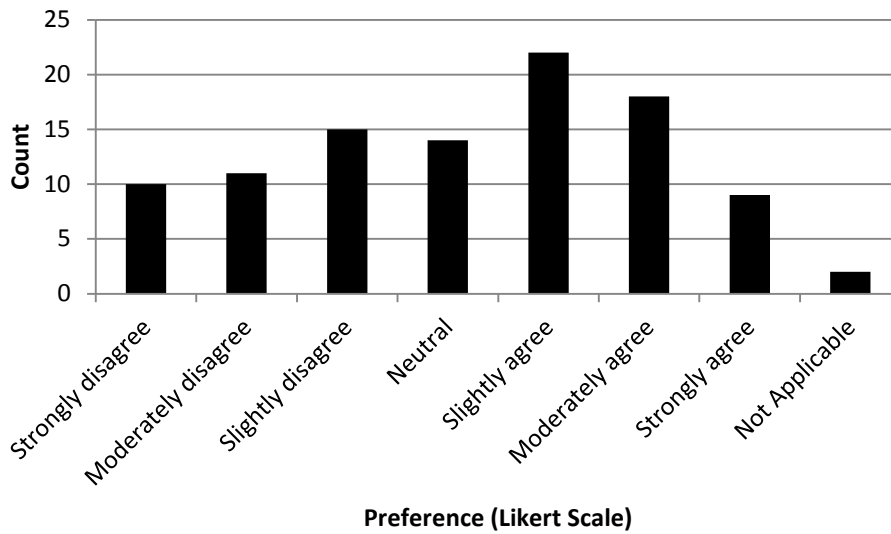
From the results of the regressions, the pay structure assigned to participants played a statistically significant role in determining a participant's preferences for treatment plans. For example, the capitation method had a significant and negative correlation in regards to a preference for treatment 2. I conclude that hypothesis 1, medical students incentivized under FFS will choose the treatment with higher costs (treatment 2) relative to capitation, is supported. Next, the capitation method had a significant and positive correlation in regards to a preference for treatment 1. I conclude that hypothesis 2, medical students incentivized under capitation will choose the treatment with lower costs (treatment 1) relative to FFS, is supported. In addition, the primary independent variable under review, pay structure, is statistically significant at the 1 percent significance level.

Other variables that were significant were students with a double major, age, and students expecting to specialize in other disciplines not listed in figure 4. These control variables have limited explanatory power because they are significant at only $\alpha=.10$. In addition, categories like 'Double Major' and 'Other' had a wide variety of majors and specialties tied into those umbrella terms. It would be hard to analyze the specific contributing factors as to why that may have some explanatory power. Many other control variables show no explanatory power and aren't significant at any levels of alpha.

Overall, the results show that there is a significant difference in the preference for either treatment plan between the two pay structures. In addition, depending on the pay structure it can drive the physicians' preference for a particular treatment plan. This implies that pay structure is a way to promote or influence certain behaviors out of physicians. With this change in physician behavior, the cost of care on the system will also be affected. For example, pay structures can promote physicians to provide a less costly treatment, a generic drug, over a more costly drug, a name brand drug.

This is an interesting result given that the average response, according to the Likert scale, to, "The compensation method I was assigned was an important factor in determining my choice of treatment plan," was neutral. Figure 5 shows the distribution of this question. Figure 5 shows that medical students perceive that pay structure played an insignificant role in their decision making. This opposes the results that show that pay structure was the main driver in their decision making. This will be discussed in section 5.

Figure 5: The Compensation method was an important factor in determining my choice of treatment plan.



The results show that, even in isolation of one another, the results are similar to results described in the existing literature; a state of an existing pay structure and an after-state, with the implementation of a new pay structure. In addition, even with a “clean” group of medical students who have not worked under either pay structure, the results are similar to that of physicians that have prior experience in pay structure.

5. Discussion

From the results of the survey, there are three implications going forward that must be considered. First, policymakers and hospital management must understand that payment schemes and compensation can affect the behavior of physicians in deciding how to provide care. Second, this change in behavior also affects the cost imposed on the system. Third, there are implications on the study design and use of a “clean” sample.

Pay Structure and Physician Behavior

First, from the results, it was shown that pay structure plays a significant role in influencing physician behavior. Specifically, this study showed that different pay structures can promote the preference for one treatment option versus another treatment option. The implication of this result means that management can promote physicians to follow certain practices or choose or not choose particular treatments. For example, pay structures or financial incentives can influence physicians to provide more preventative care procedures (e.g. booster shots) rather than reactive care (e.g. antibiotics).

Management must promote the behavior they want their physicians to express with the appropriate payment structure that fits their needs. For example, one hospital may want to reduce costs, but another hospital wants to increase preventative care procedures. These two initiatives need different incentive structures. Potentially, policymakers could incorporate a more robust structure that involves measuring quality of care. Based on the results of the survey, 73% of participants strongly agreed that quality of care is an important factor in determining physician compensation.

Another option is to put systems into place that prevent physicians from making choices based solely on monetary incentives. A series of checks and balances can prevent physicians from taking advantage of the system for personal gain. For example, evidence-based practice is an application where decision making is based on providing evidence and support to back up the certain decisions made about providing care to a patient. By paying physicians to abide by evidence-based practice, management may reduce the risk of physicians taking advantage of the system. Specifically, by incentivizing physicians to provide evidence for the care they provide, this may reduce the amount of unnecessary procedures.

Pay Structure and Cost of Care on the System

Second, another implication from the study is that pay structure can indirectly affect the cost of care given on the system. Rather than focusing on how much physicians are paid, in respect to salary, management must analyze how their pay structure is affecting the cost to provide care. Results support that capitation can be a method to reduce costs on the system. Physicians' profit was tied to the amount of care given. Since the physician is motivated to benefit themselves, the cost of care on the system also benefitted. Whereas, for physicians paid under FFS, their compensation is tied to cost in a way that does not promote reducing costs. Since the physician was motivated to provide more costly care, this can increase the costs for the system.

Understanding that physician pay can affect the cost of care on the system, this can be a place of cost reduction or containment. If hospitals are looking to promote cost reduction, they can tie pay structure to the cost of care on the system. For example, management can promote physicians to deliver less costly treatment options by aligning monetary incentives to provide those treatments rather than a more expensive treatment.

Pay Structure for a "Clean" Sample

Third, the last implication is that with the use of a "clean" sample, medical students, with little exposure to pay structure, showed the expected results of physicians that had exposure to prior pay structures. In addition, there is a significant difference in preference for treatment options between the two pay structures when comparing the two pay structures independent of one another. As stated in section 5, medical students stated that, on average, they were neutral towards the pay structure when making decisions on treatment options. This is in opposition to the results of the study. Perhaps, the medical students are unwilling to admit that monetary

incentives have an impact making decisions about treatment options, but would rather focus on other factors such as efficacy. Another reason may be due to the way the study was designed. Medical students were not being rewarded monetarily, in real life, but rather hypothetically. They may have little understanding on how the pay structure directly affected them.

Another perspective may be that this new generation of physicians may have a different value structure than older generations of physicians. For example, pay structure may not influence future physicians to a greater degree than it has, seen in previous research. When deciding which treatment plan participants would prescribe, all 50 participants incentivized under capitation said treatment 1. Of the 51 participants incentivized under FFS, given the choice to prescribe one treatment plan, 40 would prescribe treatment plan 1. These results show that, irrespective of capitation, approximately 80% of participants under FFS would choose the lower cost treatment. Medical students, under FFS, would rather choose the lower cost option and receive lower reimbursement. Since medical students are the new generation of caregivers, they may prove more conscientious of costs on the system.

This thesis is only a starting point for research. Future research can attempt to understand how important of a role pay structure plays in the decision making process of physicians in comparison to other factors, e.g. patient history, efficacy of treatment, number of treatment options. Furthermore, more research must be done on different pay structures, such as bundled payments. Bundled payments reimburse providers based on expected costs for episodes of care, such as a myocardial infarction (Miller, 2008). This thesis and much of the literature that was reviewed compare the two primary methods of compensation, FFS and the capitation method. More creative structures that incentivize different behavior must be developed and researched. A final area of research could be discovering trend changes between older physicians and new

physicians and if there is profound differences in behavior given a set of incentives. New physicians may be less affected by financial incentives and more focused on providing the “best” care. Specifically, new physicians may weigh factors such as efficacy more heavily than personal monetary benefit. In addition, they may be more conscientious of cost on the system.

6. Conclusion

In conclusion, this thesis set out to figure out if pay structures can affect physician behavior and their implications cost of care on the system. This question was triggered by the need to cut costs in the healthcare field. The literature shows that different pay structures can motivate different behaviors of physicians and this has effects on the cost to the system. Comparing different pay structures in isolation and on clean populations is a current gap in literature. To address this gap, this thesis surveyed medical students and separated the pay structures into isolate groups. To answer the proposed question, a survey was created to assess how medical students made decisions on treatment plans, given a compensation method.

The first hypothesis proposed that physicians incentivized under the capitation method would prefer the lower cost treatment. The second hypothesis proposed that physicians incentivized under FFS would prefer the higher cost treatment. Results show that the compensation method given to medical students has a statistically significant effect on the choices they make regarding treatment options. With each payment structure being compared to one another, both hypotheses were supported.

This thesis displays that pay structure can affect physician behavior which has effects on the cost of care given. While this study addresses a gap in the literature, additional must be done to address all the complexities that exist in the healthcare field. Given the limitations and

assumptions mentioned in section 3, there are still fundamental ideas that can be derived. The fundamental takeaway is that pay structure plays a significant role in decision making for physicians and that this connection has indirect effects on the costs for the system.

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Appendix

Survey for Thesis

(Please note, draft of survey does not include introduction, consent form or raffle form)

- Year in Medical School?
- Male or female?
- Age?
- Undergraduate major?
- International vs. domestic?
- Intended specialty?

Primer...

Physicians in the United States are reimbursed for the services they provide to patients by two main methods.

One method is **fee-for-service (FFS)**. Under FFS, physicians are compensated for every single service they provide. All of the services physicians provide are assigned a unique code. For example, a preventative checkup for a patient between years 5-11 would be assigned a code 99393. These codes have a universal reimbursement rate assigned to them.

One method is the **capitation method**. Under capitation, physicians are compensated for providing care to a single patient over a fixed period of time, regardless of the amount of services they provide. For example, a physician will be paid a lump sum for providing services to a 65-year old female patient over a 3 month period. The compensation is calculated based on factors such as age, sex, location, pre-existing conditions etc.

Split...

Capitation (group 2...50%)

You are a solo physician who is reimbursed under solely the **capitation method** by Medicare. Your patient, a 65 year old male with no previous health complications and no family history of disease, has been diagnosed with prostate cancer and the best treatment plan is a chemotherapy regimen. There are two treatment plans/drugs that you have the option of using. Research has shown that there is no difference in efficacy of either drug. In addition, the side effects of both drugs are similar in type and rate of occurrence.

Under the capitation method, Medicare reimburses you \$4000 for all the services you will provide for 3 months.

Treatment plan 1

The chemotherapy drug you decide to administer the patient is a monthly regimen of Taxotere®. The wholesale cost is \$100 per drug treatment.

Treatment plan 2

The chemotherapy drug you decide to administer the patient is a monthly regimen of Jevtana®. The wholesale cost is \$500 per drug treatment

1. How likely are you to prescribe treatment plan 1? (1 to 7)
2. How likely are you to prescribe treatment plan 2? (1 to 7)
3. If you had to choose one, which would you prescribe?

Fee for Service (group 1...50%)

You are a solo physician who is reimbursed under solely the **Fee-For-Service method** by Medicare. Your patient, a 65 year old male with no previous health complications and no family history of disease, has been diagnosed with prostate cancer and the best treatment plan is a chemotherapy regimen. There are two treatment plans/drugs that you have the option of using. Research has shown that there is no difference in efficacy of either drug. In addition, the side effects of both drugs are similar in type and rate of occurrence.

Treatment plan 1

The chemotherapy drug you decide to administer the patient is a monthly regimen of Taxotere®. The wholesale cost is \$100. Medicare will reimburse you a cost plus percentage of 6%. Therefore, you will be reimbursed \$106 for the medication.

Treatment plan 2

The chemotherapy drug you decide to administer the patient is a monthly regimen of Jevtana®. The wholesale cost is \$500. Medicare will reimburse you a cost plus percentage of 6%. Therefore, you will be reimbursed \$530 for the drug treatment.

1. How likely are you to prescribe treatment plan 1? (1 to 7)
2. How likely are you to prescribe treatment plan 2? (1 to 7)
3. If you had to choose one, which would you prescribe? (1 or 2)

All

On a 7 point scale... (Strongly Agree, Agree, Slightly Agree, Neutral, Slightly Disagree, Disagree, And Strongly Disagree)

1. The capitation method is a fair way to reimburse physicians/hospitals.
2. The fee-for-service method is a fair way to reimburse physicians/hospitals.
3. The capitation method is an effective way to reimburse physicians/hospitals.
4. The fee-for-service method is an effective way to reimburse physicians/hospitals.
5. Productivity is an important factor in determining physician compensation.
6. Quality of care is an important factor in determining physician compensation.
7. Patient Satisfaction is an important factor in determining physician compensation.
8. The compensation method I was assigned was an important factor in determining my choice of treatment plan.
9. I prefer the capitation method.
10. I prefer fee for service.
11. I believe that the Capitation Method is widely used as a form of reimbursement today.
12. I believe that Fee for Service is widely used as a form of reimbursement today.