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Free Kidney For Sale? Substitution, the Shortage, and Procurement Policy

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Abstract
From 1989 to 2003 kidney transplant waiting lists have grown 247%. The effect of this growth and advances in kidney transplant technology has caused a shortage of available organs and the death of thousands waiting for their transplant. Current procurement policy based on altruism has failed to increase the supply of kidneys, yet many consumers and professionals are opposed to a market based system. This paper will examine the current altruistic procurement policy as well as presumed consent and a hypothetical open market approach. With the use of data from the United Network of Organ Sharing and the United States Renal Data System, I will discuss the economic and moral dilemmas of the shortage and argue for a market based procurement policy.

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Abstract From 1989 to 2003 kidney transplant waiting lists have grown 247%. The effect of this growth and advances in kidney transplant technology has caused a shortage of available organs and the death of thousands waiting for their transplant. Current procurement policy based on altruism has failed to increase the supply of kidneys, yet many consumers and professionals are opposed to a market based system. This paper will examine the current altruistic procurement policy as well as presumed consent and a hypothetical open market approach. With the use of data from the United Network of Organ Sharing and the United States Renal Data System, I will discuss the economic and moral dilemmas of the shortage and argue for a market based procurement policy.

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Introduction

Technology in the Healthcare Industry is unique in that one must weight better-quality outcomes and longer life against the costs of producing those results. Kidney transplant and dialysis treatment have been introduced and developed over the last half century and have had large benefits and costs. Specifically, the first successful kidney transplant was performed in 1954 between identical twins (Barney & Reynolds, 1989). Since then the development of immunosuppressive drugs have increased survival rates of transplant recipients and increased the number of individuals on waiting lists for transplant. Unfortunately the increase in the demand for kidneys has not been met with an increase in supply, and today 65,226 people are waiting for a kidney transplant (OPTN, 2005). This shortage of transplantable organs has lead to significant social costs that have not been corrected by the altruistic policy that guides organ procurement today.

The current policy of altruism or volunteerism is the by-product of property rights established in the two guiding statutes on transplantation and organ procurement. The Uniform Anatomical Gift Act (UAGA) of 1968 enabled people to formally document their wish to donate their body or organs for transplantation and research after death. This act is "grounded in the idea that volunteerism would supply a sufficient amount of organs for transplant while promoting altruism and protecting patient self-determination" (Barney & Reynolds, 1989). Soon after the draft of the UAGA, all fifty states passed versions of the law to be held and abided by in the procurement and transplant of organs. The second influential statue is the National Organ Transplantation Act (NOTA) passed by Congress in 1984. Within this legislation, the buying or selling of human organs became illegal. NOTA states: "It shall be unlawful for any person to knowingly acquire,

receive or otherwise transfer any human organ for valuable consideration for use in human transplantation if the transfer affects interstate commerce." Interestingly, NOTA does allow compensation for blood donation and reasonable payments for obtaining and processing a donated organ such as travel, housing, and lost wages costs (Altinanahtar, Alper, B.A., M.A., May 2004). NOTA also organized the current system of Organ Procurement Organizations into the Organ Procurement Transplant Network (OPTN) and placed the United Network for Organ Sharing as the regulatory body in the procurement and disbursement of organs.

UAGA and NOTA further specify the policy that has been present since the first kidney transplant in 1954: organ donors are unable to receive compensation for donation. The purely altruistic approach to organ procurement and the developments in medical technology have increased the shortage of donable organs drastically. In this paper I will observe the developments in technology that have made kidney transplant the more attractive treatment for End Stage Renal Disease (ESRD). I will discuss the costs associated with transplant and dialysis and the reasons for their substitutability. Three policies will be examined; the current altruistic/required request policy, presumed consent, and a hypothetical open market approach. The ethical implications of each policy will be discussed, and I will propose that a market solution will both correct the shortage and reduce costs.

This paper will rely heavily on microeconomic theory and health economic theory in its discussion of open market policy and the substitution of transplant and dialysis. This reliance is necessary because open market operations have never been implemented, thus no empirical data exists to study its effects. In addition, the amount of data that is

available for kidney transplants/costs and dialysis treatments/costs free of charge is inadequate. Still, the arguments made and the statistical data should not be unrecognized or seen as useless. The issue of the organ shortage is a large medical, economic, and ethical problem. The assumptions behind open market operations and substitution clustered with medical market observations will serve as a foundation for working toward correcting the shortage of kidney organs.

I. Dialysis, Transplant, and Substitution

Before discussing the theoretical assumptions of substitution in the medical market, I would like to elaborate on ESRD and the various treatments that are available for patients suffering from this disease. ESRD occurs when the kidneys fail, thus creating a creatinine buildup because the body is unable to filter and excrete it properly. Individuals with ESRD have three treatment options available to them; Hemodialysis, Peritoneal Dialysis, or Transplant (Bryant, 2005).

Hemodialysis is not a synthetic kidney, but it performs the blood filtering function of a healthy kidney. A patient undergoing hemodialysis must be hooked up to a machine three times a week for periods of three to four hours per treatment. The machine acts as a filter passing urine, while retaining suspended proteins. This treatment requires a surgical procedure where a fistula is created to accommodate the sixteen gauge needle that must be directly inserted into the patient's vein (Bryant, 2005).

Peritoneal Dialysis (CAPD or CCPD) is a less evasive treatment which requires no medical assistance and can be performed at home. This treatment works inside the body using the peritoneal membrane to retain a reservoir of dialysis solution which is exchanged via catheter every four to six hours. It is important to recognize that

peritoneal dialysis does have an increased probability of infection and is more machine-dependant, but it does allow the patient daytime freedom because the treatment can be administered during sleep due to an automated cycler (Bryant, 2005).

The third and final option for ESRD patients is transplant. With the introduction of immunosuppressive drugs, which fight the body's instinct to destroy foreign objects such as the new kidney, transplant survival rates have increased substantially. Patients must be on these immunosuppressive drugs for the duration of their post-transplant life and initial costs for transplant are quite high. The main problem with transplant is the shortage of available organs; the patient may never get the organ that he or she needs so desperately (Bryant, 2005).

A. Why are Transplants and Dialysis Substitutes

Economists assume that when consumers make choices, such as choosing dialysis or transplant, they act rationally. This is to say that consumers are risk adverse, price minimizing, and benefit maximizing beings. Along with this logic, consumers are assumed to choose a good or service as long as the good or service's marginal benefit is greater than or equal to its marginal cost.

Certain constraints must be placed on this behavior. The rational choice model considers a world with two goods and measures the amount of goods that a person will consume in bundles or a particular combination of the two specified goods. The bundles available to the consumer are constrained by that consumer's income in the form of a budget line, which is the set of all bundles that exactly exhaust the consumer's income. Indifference curves are then used to identify when a consumer is indifferent to a set of bundles. The indifference curve that lies above the budget constraint is preferred to those

that are on the budget constraint and the indifference curve on the budget constraint is preferred to those under it. With the use of budget constraints and indifference curves, a consumer's utility choices can be derived (Frank, 2003).

This microeconomic model is transferable to health economics and patient decisions. In the medical industry, patients are deciding between different treatments that give themselves the best health outcome within a certain income range. However, the presence of third-party-payers gives the patient an extremely large "income" and the price of treatment becomes less likely to affect decisions of treatments (Henderson, 2002). The influence of third-party-payers in ESRD began with the 1979 amendment to the Social Security Act which allowed the federal government to pay for 80 percent of treatment costs (both dialysis and transplant) for kidney disease (Blair & Kaserman, 1991). Private insurance has also increased its coverage in transplant costs, which has further clouded the consumer's sensitivity to price. The presence of third-party-payers lowers the out-of-pocket costs for the consumer. When you are not paying the bills, there is little incentive to reduce demand or act rationally when considering the price of transplant and dialysis (Henderson, 2002). The impact of third-party-payers will have a direct impact on the analysis of the rational choice theory for dialysis and transplant.

Finally, in the medical care industry, treatments that lead to the same outcome are considered substitutes. As described above, the influence of third-party-payers makes consumers extremely insensitive to price and makes demand for medical treatments extremely price inelastic. Appropriately, the high costs of dialysis treatment and kidney transplant are infinitesimal when considering the possible health advantages to these treatments. Patients will focus more on the time involved to administer dialysis treatment

or the physical strain from kidney surgery and weigh the health benefits with these costs rather than monetary expenses.

B. *Empirical Analysis and Findings*

When using the rational choice model in considering dialysis and transplant there must be a few modifications. First, the consumer cannot use both treatments or consume a half of a transplant. They must consume X dialysis treatments (dialysis is an on going procedure) or one transplant. This will lead the analysis to a corner solution, or when the consumer does not consume one of the goods. Second, because of third-party-payments from Medicare and private insurance the cost of each treatment will not largely decide which treatment a patient chooses. Therefore, patients will migrate to the treatment that offers the best outcomes. I argue that, because of the medical advances in kidney transplant such as the immunosuppressive drug cyclosporine in 1979, along with newer drugs, Prograft and Cellcept, and the costs of dialysis apparent in the hours wasted each week connected to a dialysis machine, the majority of ESRD patients would prefer transplant (Bryant, 2005). Finally, utility and demand for dialysis treatment is overstated. Patients are pushed into receiving dialysis because there is a shortage of transplantable kidneys; because of this, dialysis treatment can be considered an imperfect substitute because the results do not have the same quality. As I argued above, the majority of patients want transplant except for those who feel they could not undergo the trauma of surgery. However, this majority is moved to a lower indifference curve and receives less utility because they must be treated with dialysis.

Figure 1.1

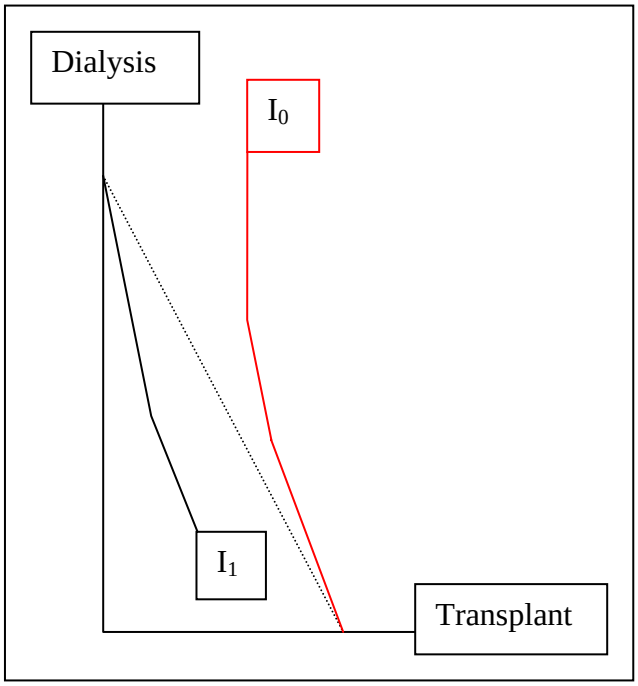


Figure 1.1 illustrates the argument in graphical form. Notice that each indifference curve, I_0 and I_1, leads to a corner solution because the patients can only consume dialysis or transplant, not both. Patients want to be on the indifference curve I_0 because they believe transplant has the most health and lifestyle benefits. However, the majority of these patients who demand transplant are moved to indifference curve I_1 because of the shortage of organs available for transplant. I_1 is less preferable to these people because it is below I_0, where their utility is maximized.

To study the shortage of kidneys and the substitution effects of dialysis treatment, I turned to the United Network of Organ Sharing (UNOS) and the United States Renal Data System (USRDS). These groups provide transplant and renal data free of charge to the public for educational and research purposes. Although I found sufficient data for my undergraduate research and argument of substitution and the resulting shortage, I must rely heavily on the theory behind the numbers. There is no such thing as a free lunch;

thus, the data set from UNOS and USRDS is smaller than a data set from a subscription based supplier. More importantly, although the data set is diminutive, the results convey the theory on which I rely.

My sample for analysis stretched from 1996 to 2002 for transplant "patient years at risk," and dialysis Medicare payments per "patient years at risk." To determine the substitution of kidney transplant for dialysis treatment, I named transplant my dependent variable with dialysis and time as my independent variables. I then performed a regression of these three variable's natural logs to determine the cross-price-elasticity of transplant and dialysis. Cross-price-elasticity is the percentage change in the quantity demanded of one good caused by a one percent change in the price of the other. The results of this ratio if below zero are compliments, and if above zero are substitutes.

The following are my results:

Regression output					*confidence interval*	
variables	*coefficients*	*std. error*	*t (df=4)*	*p-value*	*95% lower*	*95% upper*
intercept	-87.3694	5.0388	-17.339	.0001	-101.3593	-73.3796
LN of Dialysis Pmts	0.0873	0.0825	1.059	.3495	-0.1417	0.3164
Time in years	0.0486	0.0028	17.598	.0001	0.0410	0.0563

Data Source: (USRDS, 2005)

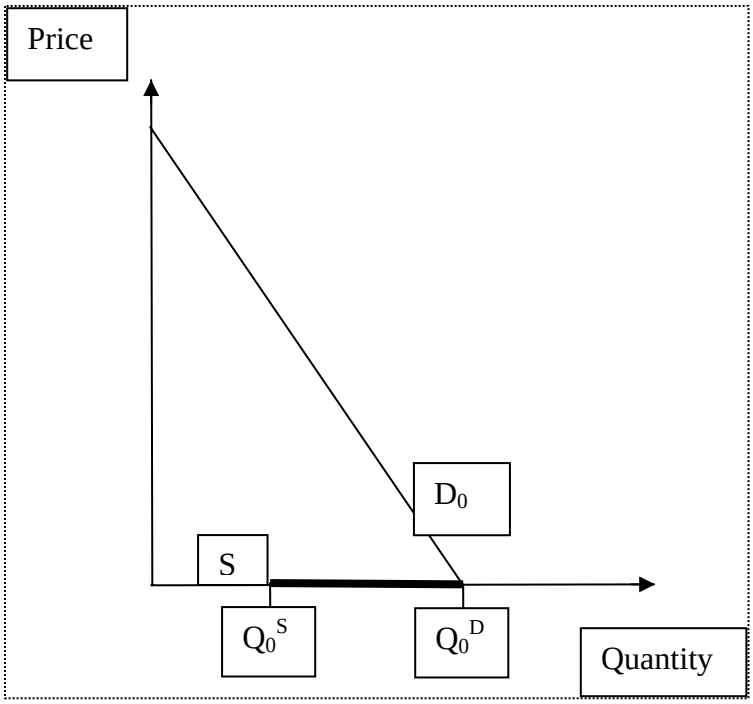
Though my sample was relatively small, only covering seven years, the results can be explained by the budget constraint and indifference curve model that I presented above. With a 10% increase in the price of dialysis there will be an increase in quantity demanded for transplants of 8.73%. As apparent by the t-statistic, less than the absolute value of two and a p-value stating a 34.95% chance that the results occur because of random chance this coefficient suggests an increase in the price of dialysis treatment would not be reason for increased demand for transplantation. This result does not come

as a surprise when considering third-party-payers. The out-of-pocket payment for the patients would increase by very little relative to the increase in the total price of the treatment. Therefore, an increase in the price of either treatment will not have a large effect on the demand of the substitute good. Also, in figure 1.1, I argued that most ESRD patients would prefer transplantation, thus wanting to be on indifference curve $I_{0,}$ but the shortage of organs moves the patients to indifference curve $I_{1,}$ consuming dialysis. Consequently, no matter what the cost of dialysis, the majority of ESRD patients will have to consume dialysis. This explains the poor significance of a rise in the price of dialysis affecting the quantity of transplants demanded.

II. The Shortage

A shortage occurs when the price of the good is set below the equilibrium level. Thus, shortages occur when a price ceiling, the most a good can be sold for, is set below the equilibrium price and quantity. When looking at the transplant market, we can assert that the zero price for kidneys, which must be maintained by transplant centers, is a price ceiling. Under the current policy, procurement organizations have been unable to supply the number of organs that are needed for those wanting kidney transplants. This relationship is shown in figure 1.2 where D_0 is the demand for kidney transplants and S is the supply for transplant. Notice that the demand curve is fairly steep, indicating that consumption is inelastic because of third-party-payers. Also notice that the supply is fixed at Q_0^S because the price of kidneys is zero and selling above that price is illegal. With the price set at zero, a shortage is created shown by $Q_0^D - Q_0^S$, noted by the bold line.

Figure 1.2

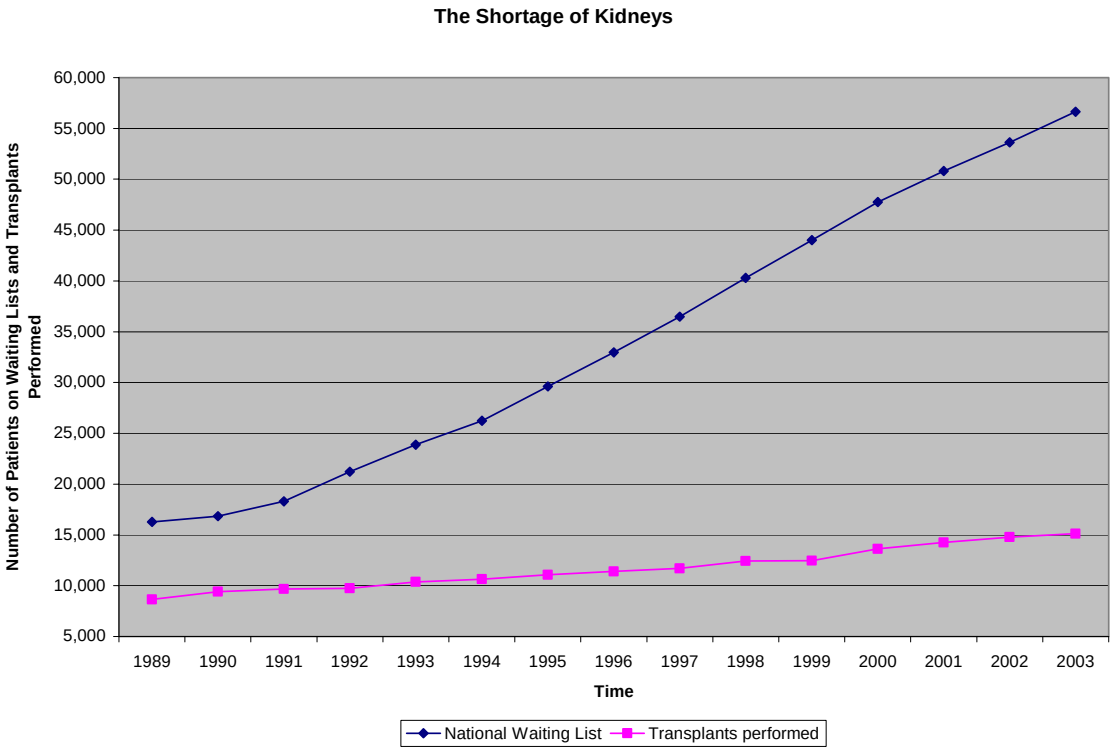


This shortage will persist as long as there is a price ceiling on the price of kidneys. Later in this paper I will show how this shortage will be decreased and potentially eliminated by the institution of an open market.

A. The Size of the Shortage

The present shortage of kidneys is the result of the zero price that is placed on them. Since 1989 there has been an enormous increase of 247% in the number of patients on the waiting list and a small increase of 74% in the number of organs supplied by living and dead donors. However, when looking at this problem, the actual number of kidneys demanded is compressed because many doctors will not allow patients who want a kidney to be on the waiting list because they do not meet certain medical criterion to be a candidate for transplant, though they would be a candidate if there was a large enough supply of organs. Graphically the shortage of kidneys is represented by:

Figure 1.3



Source: www.optn.org

This graph shows the upward trend of the waiting list and the meager incline of transplants performed. But why is the gap widening?

B. Why is it increasing

As seen by the waiting list data presented in the previous section the shortage of kidneys is increasing at alarming rates, 247% since 1989 (UNOS, 2005). The reason for this shortage is explained by three phenomena.

The first is a growth in technology. Medicine is always changing because of advances in drugs and procedures, thus causing a problem of higher costs for the same treatment but better results. Kidney transplant has evolved since its birth in the middle of the twentieth century beginning with transplantation only being possible between patients who were genetically related. At that time, rejection of the organ was extremely likely,

so patients had to bring in potential living donors to the hospital with them for the operation. If the patient could not find a suitable donor, there would be no operations, hence, no shortage (Altinanahtar, Alper, B.A., M.A., May 2004). With the introduction of the immunosuppressive drugs, cyclosporine in 1979 and new drugs Prograft and Cellcept, rejection rates decreased drastically and survival rates increased, making transplant the procedure of choice for ESRD patients (Bryant, 2005)

The increase in third-party-payments has also increased the shortage of kidneys. With the amendment of Medicare in 1979 increasing Medicare payments for kidney disease and private insurance shifting transplant from an experimental coverage procedure to a regular procedure, the financial burden of transplantation became less of an issue for ESRD patients when deciding between dialysis and transplantation. Since the high initial cost of transplant was cut down by private insurance and Medicare payments, patients have moved toward transplant as the preferred treatment which has increased the demand for transplant and increased the shortage.

Finally, the shortage has increased because of the failure of the current procurement system. The amount of cadaver organs has increased only slightly since 1986 with living donors showing the same results (Blair & Kaserman, 1991). This low rate of growth is due to a paradox which has been written about at length. The number of deaths from car accidents, which yields the most suitable donor suppliers, has decreased with the increased usage of helmets and seatbelts. Campaigns against drunk driving have also reduced the number of car accidents along with decreasing the amount of donor-eligible subjects (Annas, June 1988). Though the number of organs harvested is not increasing at levels that are needed, the decrease in traffic accident deaths is a great

accomplishment and should be looked at as a positive. To counteract this stagnation of cadaver and living organ donation, the National Organ Transplant Act of 1984 increased federal funding for the procurement of organs, but various educational campaigns have failed to reduce the gap between supply and demand significantly.

C. The effects of the Shortage

The rapid increase in the demand for kidneys juxtaposed with the slow increase in the supply for kidneys has caused large social costs on the United States. The failure of instituting the proper policy to procure organs has caused monetary and non-monetary costs.

The most obvious of these costs is loss of life. Each year a multitude of patients die from kidney failure. The Organ Procurement and Transplant Network documents the number of patients on waiting lists removed because of death, below is death removal data from 1995-2004:

All Region Death Removals from Waiting Lists

1995	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*
3,723	4,247	4,811	5,505	6,971	6,639	7,195	7,257	7,008	6,727

Source: www.optn.org

The above numbers should be considered relative estimates because they do not include the large number of patients that are unable to be placed on kidney waiting lists. These patients include those that do not meet the specifications that nephrologists must use to decide who is most in need or would most benefit from a transplant. With this in mind, the costs of life are not only those that are on waiting lists for donation but those that are unable to be placed on waiting lists because they are inadequate candidates for the "precious" and "scarce" kidney.

Less obvious costs are those associated with dialysis treatment. Since many patients with ESRD are unable to receive a transplant they must consume dialysis, making dialysis more of an imperfect substitute than a treatment that yields the same results as transplant. Dialysis costs are apparent in the time needed to be hooked up to the machine, which occurs for three hours per treatment about three to four times per week (Bryant, 2005). If transplant was available to these patients, the time lost while undergoing dialysis could be filled with more productive activities benefiting the individual and society. Finally, patients must undergo surgery to accommodate the sixteen gauge needle which must be directly inserted into a vascular artery for treatment. During each treatment the skin covering this fistula must be broken, which provides further discomfort.

Monetary costs are also apparent because of the shortage of kidneys. Paul Eggers has compared the costs of dialysis treatment to transplant treatment in multiple studies. Each time he has found that transplant is less costly relative to dialysis over time. Dialysis costs remain stable over the time of treatment, while transplant has a very high initial cost but lower maintenance costs, assuming there are no complications to the procedure (Eggers, 1992). His study further supported the belief that transplant was less costly than dialysis treatment over time. The high initial cost of transplant was recovered in about 4 ½ years with a ten year savings of $42,000 (Eggers, 1992). The shortage of organs prevents the United States Medicare system from collecting the savings that it could if less dialysis was used and more organs were available to ESRD patients.

Lastly, a black market for kidneys has developed because of this shortage. If patients waiting for kidneys in the United States cannot get them, they can go abroad and

buy a kidney from individuals that are willing to sell them. Individuals in countries such as the United States, Canada, Italy, Australia, Japan, and Saudi Arabia have been found buying kidneys from people in poorer countries such as Romania, Philippines, Peru, India, and China (Scheper-Hughes, 2005). Buyers are willing to pay a large range of prices for their kidney, from $750 to $30,000. With the institution of an open market for cadaver organs, this black market for living donors would potentially decrease.

The shortage of kidneys is causing loss of life, large Medicare payments, productivity and quality of care deficiencies, and a black market for kidneys. As waiting lists grow and more patients are diagnosed with ESRD these costs will escalate. Knowing this we must look at the current procurement systems efforts and effects on the supply of donable organs.

III. Required Request and the Current Procurement System

The current procurement system is based on a volunteerism and altruistic framework. In the 1970s and 1980s deaths from the shortage of kidneys were on the rise, and there was a need to implement a policy that would help the procurement of organs. The answer was required request. This policy required physicians or nurses to request for donation from the family members or guardians at the time of death (Caplan & Welvang, February 1989). This policy kept the altruistic ideology of autonomy and giving, while increasing the amount of organs that were available to transplant.

A. Is required request working?

Economic researchers have studied required request from the day it was implemented. Education has been the most important part of required request. United

States policy makers have two central assumptions which govern organ donation. First, physicians and nurses fail to ask families to donate, and secondly, families donate if asked (Siminoff, Laura A., PhD, Arnold, Robert M., MD, Caplan, Arthur L., PhD, Virnig, Beth A., PhD, & Seltzer, Deborah L., BA, July 1995). These assumptions have been challenged with a study performed by Siminoff, Arnold, Caplan, Virnig, and Seltzer which examines why required request has not increased organ procurement.

Their study found that 83% of healthcare professionals correctly identify donable organs, and families of donor-eligible patients were approached about donation 73% of the time (Siminoff, Laura A., PhD et al., July 1995). From these findings, the assumption that physicians and nurses do not approach donor eligible patients seems to be misleading. More interestingly, Siminoff and her colleagues found that, of the families that were approached for organ donation, only 46.5% agreed to donate. This too goes against the assumption that if families are asked they will agree to donate (Siminoff, Laura A., PhD et al., July 1995).

Many of the reasons families fail to consent are unclear. With 95% of Americans stating that they are aware of transplant and about 75% wanting to donate an organ after their death, the low percentage of families willing to allow donation comes as a surprise. Research has been mixed regarding the "donation experience." Some families find the approachment process to be comfortable, while others believe it to be a very real affirmation of the death of their loved one (Siminoff, Laura A., PhD et al., July 1995). This is evidence that the altruistic ideal is not at fault, but rather the approachment process. It still is not known when the best time to confront families about donation. However, it is clear that a family's knowledge of a patient's wishes to donate before their

death is central to the procurement of organs (Siminoff, Laura A., PhD et al., July 1995). Education seems to be the answer to these difficulties and continues to be the platform which procurement organizations use to increase the likelihood of donation.

Another study by Virnig and Caplan also examined the poor performance of required request procurement efforts. This study also found that required request support was very high among medical professionals and their request efforts were just as robust; however, the refusal rates were extremely large. Though the study found that required request did not have much of an impact on procurement, it did find that the effects of this law helped hospitals become more effective in identifying donor-eligible patients (Virnig & Caplan, October 1992). Considering these results, required request has not failed entirely. Though organ increases have not been evident, required request has forced hospitals to become efficient in identifying and approaching potential donors.

IV. Alternative Solutions

The increased efficiency of hospitals to identify donable organs, although a step in the right direction, has not increased the number of organs obtained by any significant measure. Many authors have pondered how to influence the current system to increase donation, and all authors point toward the conclusions found by Siminoff--education of transplantation is vital. Though education of treatments must always be used to make people aware of the "gift of life" they could give to an ERSD patient, the most promising policy alternatives are found in presumed consent and an open market. Presumed consent is used widely in Europe, while an open market for organs has never been implemented. The open market policy will be discussed more thoroughly than presumed consent but a basic understanding of both is necessary.

A. Presumed Consent

Presumed consent is an organ procurement policy which defines all individuals as donors unless they clearly indicate that they do not wish to donate during their lifetime (Phillips, 2003). Many European countries including Spain, Belgium, and the Czech Republic, which procure more organs than the United States, use presumed consent. Though presumed consent policy has had great procurement effects in some countries, such as those listed above, other countries that use presumed consent for procurement have experienced less robust results. When considering this, it would be false to attribute the increases in organ procurement entirely to the presumed consent without considering the importance of the hospital's policies for procuring organs (Altinanahtar, Alper, B.A., M.A., May 2004).

Far more important when discussing policies are the constraints placed on basic human rights. Presumed consent is a policy that allows the government to "own" ones body as a "sack of spare parts" (Phillips, 2003). This policy undermines individual preference and autonomy and places the ownership of ones body into the hands of the hospital or government, unless the donor specified before death that he or she wished not to donate. Blair and Kaserman argue that though presumed consent may yield more organs, it does so in a way that takes advantage of the general public by using their reluctance to dissent and their ignorance or temporary confusion as a means to procure organs (Blair & Kaserman, 1991).

There is also little public backing for presumed consent. Surveys given out by Adams, Barnett, and Kaserman indicate that of the 391 respondents, 66% would be

offended if governmental policy would allow their organs to be removed without the donor's consent.

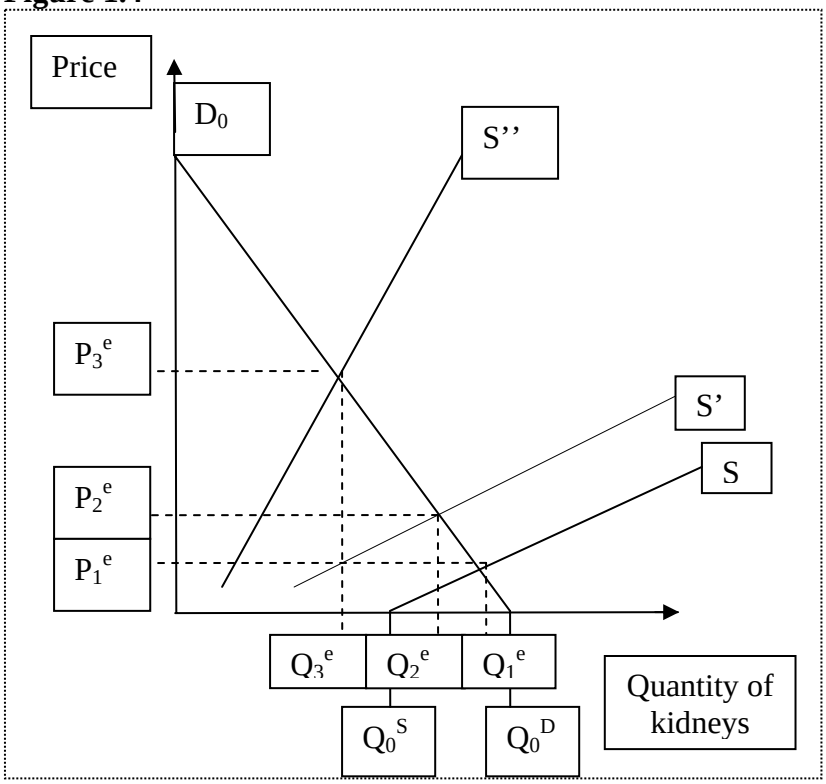
B. Open Market

Instituting an open market in the existence of a shortage or excess demand is an extremely common policy in the United States. This classical approach to disequilibrium has lasted through centuries as one that decreases shortages and provides a more efficient use of resources. Establishing a market for kidneys involves much more than simply allowing kidneys to be bought and sold because it is an extremely complicated market which combines questions of efficiency and quality with real ethical dilemmas. Adams, Barnett, Blair, Beard, and Kaserman have written extensively about open markets for kidneys and have promoted their findings since the early nineties. Their results and ideas will be used in creating and explaining the open market argument presented below.

There are extreme ethical conflicts with the institution of a living donor open market; thus, I am arguing for a market for only those that are deceased. Many different market solutions exist; however, Blair and Kaserman assume the following circumstances, which I will also defend: the potential donor will be paid a fixed amount of money, in the form of cash or tax credit, for entering into a binding contract which allows the removal of one or more organs after death (Blair & Kaserman, 1991). Under this assumption it is important to understand that the shortage of kidneys does not come from a lack of deaths which yield transplantable organs but of the current systems ability to only collect 15-20% of the existing supply of cadaver organs (Adams, Barnett, & Kaserman, 1999).

The current procurement system is preferred by some economists for two economic criticisms. First, individuals may be willing to donate at a zero price, however, when the altruistic policy is replaced by one that pays a price above zero, these donors may not donate at all because the self-giving component of the policy is gone. Second, since a market has never been implemented in organs, the reaction of potential donors to a small price increase is not known. The question here is will the supply curve be elastic or inelastic? Adams, Barnett and Kaserman developed a model which presents three possible situations that could arise with the institution of a monetary incentive. Figure 1.4 graphically illustrates these situations.

Figure 1.4



Source: (Adams et al., 1999)

Under the current policy the quantity of kidneys supplied is Q_0^S at a zero price. The shortage is apparent when subtracting Q_0^D from Q_0^S. This was discussed earlier in the

paper. The supply curve S models a market where there is no negative response (those who were willing to donate at zero price but will not at a price above zero) and is relatively price elastic. The shortage is substantially lowered from $Q_0^D - Q_0^S$ to $Q_0^D - Q_1^e$. Supply curve S' illustrates a slight negative effect in which potential suppliers are offended by the sale of organs and withdrawal from the market. With a slightly higher price and lower quantity than supply curve S, the shortage is only decreased from $Q_0^D - Q_0^S$ to $Q_0^D - Q_2^e$. Finally, supply curve S'' demonstrates a large negative shift and little responsiveness to price change. In this scenario the supply of kidneys is actually lower than the supply when a purely altruistic policy is used!

The importance of knowing which of the above situations bests fits the supply of kidneys is essential to implementing an open market policy. If supply curves S or S' embody the true supply curve for kidneys than open market policy is far more beneficial than the current system. However, if the kidney supply curves has more in common with S'', then open market policy would decrease the benefits of the current altruistic policy and be a poor choice to correct the shortage of kidneys.

To answer this question Adams, Barnett, and Kaserman surveyed 391 students in eight different courses at the University of Auburn. This study was the first empirical study on organ sale of its kind and its findings supported the widespread theoretical belief that an open market for organs would supply a sufficient amount of kidneys to alleviate the shortage. Most importantly, their findings illustrated that the supply curve for kidneys would have only a small negative impact of donors leaving the market because they were offended. The survey indicated that 96% of the sample were not offended by organ sales or were willing to donate despite being offended by the idea of the open

market, thus only a 4% supply intercept shift would occur (Adams et al., 1999) The survey also provided an estimate of prices the surveyed students would be willing to accept for donating after death. Below are the price findings.

Supply Schedule for Organ Donors

Price	Number of donors	Increase in donors
$0	138	
$10	149	11
$250	165	27
$50	183	45
$100	221	83
$500	249	111
$1,000	299	**161**
$5,000	311	173
Over $5000	338	200

Source: (Adams et al., 1999)

The large increase in the number of donors willing to donate with a price of just $1,000 suggests that kidney suppliers would be price sensitive, thus a semi-flat supply curve. With these two empirical findings, Adams, Barnett, and Kaserman believe that the supply of kidneys would look like S' in figure 1.4.

V. Ethical Concerns

The open market solution to the shortage of transplantable kidneys is one that has been viewed by the American Medical Association and the American Hospital Association as policy that is unethical and inappropriate for organ procurement. Yet the current policy, as seen above, has failed to yield sufficient organs, so why has this policy of altruism persisted? The answer to this question is based on the ethical arguments of: Coercion of the Poor, Transplant Accessibility for the Poor, and Premature Termination of Care.

A. Coercion of the Poor

The first argument against an open market for organs is the coercion of the poor into donation. This ethical argument is based on the poor being enticed by the economic incentive of donation that would help their current position in life but may supersede various religious or moral convictions (Blair & Kaserman, 1991). The validity of this argument in the above policy solution is quite flawed. Coercion of the poor assumes that the price of the kidney would be high enough to make the poor act in such a manner. If the price of the organ is kept low, which has been argued in the previous section, the poor would not be inclined to donate because they hold their moral beliefs at a higher value.

One must also observe the current procurement system in which families of patients are pushed, or coaxed into giving their kin's kidney away free of charge. These procedures are extremely coercive to those who are donating their organs. Also, since the current policy cannot procure a sufficient amount of organs the poor from third world countries are selling their organs to first world buyers because of the economic gains they can achieve from such a transaction. Thus, coercion of the poor is occurring with the current policy. With an increase in the number of organs obtained from an open market policy, the number of the third world poor donating would decrease because the demand for overseas organs would decline. Finally, those who argue for the altruistic policies must take responsibility for the high social costs that occur to avoid this coercion.

B. Transplant Accessibility for the Poor

The second ethical concern is transplant accessibility for the poor, which states that only the wealthy will be able to afford transplant (Blair & Kaserman, 1991). Once again this argument assumes that the price for kidneys would be very high, Adam's,

Barnett's, and Kaserman's results deter. Also, in speaking with multiple doctors, it was revealed that the poor are the people that are most likely to suffer from End Stage Renal Disease because they lack the resources to provide themselves with adequate healthcare and nutrition. With this in mind, an increase in the number of organs procured would benefit the poor more than any other group. Not only would the poor waiting for their kidney have a better chance of transplant but those that did not make it on the waiting list would be able to receive transplant because of the increase in supply of organs.

Finally, accessibility concerns do not take into consideration third-party-payers. As mentioned, the amendment to social security in 1972 allows payment of 80% by the federal government for kidney disease. When considering the cost of a kidney to be $1000, the patient would only be paying $200. The increase in price of $200 is quite insignificant in terms of the full cost of a transplant and the benefits to life received by transplant.

C. *Premature Termination of Care*

The last ethical concern deals with the doctor impeding care though the patient could benefit from sustained treatment (Blair & Kaserman, 1991). Once again this argument assumes that the price of a kidney would be high enough to entice family members or doctors to withdrawal care. In addition, it assumes that the doctor would somehow gain from the procurement of their patient's organ, which is not the case. Under the open market policy the property rights of the organs would belong to the party that entered into the contract with the donor, including the family or procurement firms. This contract certifies that the practicing physician has no incentive to remove care from the patient.

VI. Conclusion

The topic of open market operations to diminish the shortage of transplantable organs is a very emotionally charged topic that must be addressed. In this paper I have discussed the treatments and medical history of End Stage Renal Disease and shown the substitutability of dialysis treatment and kidney transplant. Because of medical advances, most importantly immunosuppressive drugs, coupled with the time consuming costs of dialysis treatment, transplant has become the consumer's preferable choice when treating ESRD. Though patients demand transplants technological advances, third-party-payers and the current procurement policy have created an extremely large shortage of transplantable organs, which forces patients to consume dialysis.

This shortage has created significant social costs. Patients taken off transplant waiting lists because of death have numbered over 6,000 for the past five consecutive years. Medicare payments are far larger than they would be if enough organs were available for transplant. Dialysis treatment renders its patients less productive than they could be as a result of the hours they must be hooked up to a machine every week. Finally, an overseas black market has developed for kidneys in which citizens of the United States and other first world countries have bought organs for transplant.

These four costs could be diminished with the institution of an open market for cadaver organs. Adams, Barnett, and Kaserman have helped further the debate for open markets in the procurement of kidneys showing that the price of kidneys would be relatively low, thus making it worthwhile to implement. However, in the real world will the price of kidneys exceed their cost in this empirical model? The answer to this question will not be fully answered until an open market is implemented and tested in the

real world. However, specific policy procedures and constraints would be needed to prevent a large increase in price. If the price of kidneys became too high the ethical concerns for the poor described in the previous section would be quite relevant, thus making open markets the wrong choice for policy. Though economics is an analytical science, one must never forget the impact policy has on those people who are most vulnerable.

In conclusion, this open minded debate on procurement policy must persist if we are to ever alleviate the shortage of kidneys and the large social costs that result from this shortage. Policy makers must look at this issue from all angles and determine how best to fix the problem. Though open market operations may not be the most popular solution to the kidney shortage, it must be considered and pondered when approaching the daunting task of alleviating the kidney shortage.

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