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Is dumping socially inefficient?

An analysis of the effect of Medicare's prospective payment system on the utilization of Veterans Affairs inpatient services

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This paper investigates an efficiency implication of Medicare's prospective payment system (PPS) on the utilization of United States Veterans Affairs (VA) hospital inpatient services by elderly veterans. There is empirical evidence to suggest that non-VA hospitals are reacting to PPS by increasingly shifting veterans they expect may be high-cost to VA hospitals. We define as efficient, allocations that would occur if hospitals acted as perfect agents of the patient, then we show that some shifting would still occur if allocations were efficient. This is because VA and non-VA hospitals operate under different budget regimes, and within each diagnosis related group, veterans with different levels of illness severity (and different non-VA insurance packages) will self-select into VA and non-VA hospitals. We derive conditions of severity under which different hospital types become attractive to particular patients.

1. Introduction

This paper argues that some of the recent increase in patient shifting from non-Veterans Affairs (non-VA) to Veterans Affairs (VA) hospitals may be an

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efficient response by non-VA hospitals to Medicare's prospective payment system.[1]

The prospective payment system (PPS) under analysis is a hospital reimbursement mechanism introduced in 1983 by the U.S. public health insurance program, Medicare. Illnesses and their treatments are categorized into what are known as diagnosis related groups (DRGs). In principle, each DRG has a fixed price (the prospective payment) at which Medicare reimburses a hospital on a per-discharge basis for the treatment of Medicare recipients, regardless of the actual cost incurred by the hospital in treating the individual patient [Prospective Payment Assessment Commission (1991)].[2] PPS was introduced in response to soaring U.S. health care expenditures that grew at a rate of about 13 percent from 1981 to 1982 to about 10.5 percent of GNP in 1982 [Gibson et al. (1983, p. 1)].[3] Although some view these expenditures as too high and/or increasing too rapidly, a counterview is that a country can spend on medical care (or any other commodity, for that matter) whatever proportion of its income it pleases, and that 10.5 percent, or even 99.9 percent, of GNP is not too high if 'that is what people want' [e.g. Reinhardt (1984)].[4] The first view apparently prevailed in the Reagan administration, which embarked on a number of cost-cutting steps (including PPS) in an attempt to control health care costs.

PPS was expected to increase cost-consciousness and efficiency in hospitals while compensating efficient hospitals adequately for resources expended. But there is evidence that hospitals are reacting to PPS by shifting responsibility for high-cost Medicare patients to other hospitals [Wrenn (1985), Stearns (1987)]. The shifting takes a variety of forms. The most severely ill patients within a DRG as well as patients in particular DRGs may be screened out

[1]In the United States, one of the benefits to Armed Forces veterans is access to hospitals operated by the Department of Veterans Affairs. Veterans are designated to be in three categories, A, B, or C. Category A veterans (mostly those with service-related disability and/or low income) have a right to 'free' care at VA hospitals (they do not pay a monetary price). About 44 percent of all veterans are in this category. [For fuller descriptions of VA eligibility and qualification criteria, see Kosloski et al. (1987), Department of Veteran Affairs (1989)]. Medicare is a U.S. government health insurance program for elderly citizens 65 years and older, and for severely-handicapped persons. Medicare is composed of two parts: Part A covers all hospital inpatient expenses (except for physician charges) with a fixed deductible and a potential fixed dollar coinsurance amount. Part B is a supplementary program that covers physicians' fees, outpatient care, etc. Medicare covered about 30 million elderly and disabled persons in 1982 [e.g. Prospective Payment Assessment Commission (1991)]. The new policy affected only Part A.

[2]DRG payments to a hospital are determined by the 'type' of the hospital (urban or rural, size, teaching, etc.) in addition to the DRG mix. Payments are set to cover costs of each type of DRG.

[3]Hospital care, which accounted for about 42 percent of health care expenditures, grew at a rate of 15 percent in the same period.

[4]According to Weisbrod (1987, p. 1), 'The mere fact that any commodity is constituting a growing share of GNP surely does not imply a private market failure or any other basis for public policy intervention.' Without specifying an optimum, it is not obvious that health care costs are too high, or that these costs are rising too rapidly.

prior to admission and referred or transferred to other hospitals ('dumped' on other hospitals); sometimes, they are simply refused admission ('skimming'). Some hospitals discharge patients too early (only to readmit them).[5] In some other cases, patients are reclassified into higher-paying DRGs ('gaming'). Finally, a hospital can avoid treating all patients in particular DRGs by eliminating certain services.

Other things equal, the amount of hospital resources required to treat or to cure an illness is larger the sicker the person is (the more severe the illness). Within each DRG, a hospital is confronted with patients having a variety of illness severities since the DRG does not represent a particular value of severity of illness (SOI) but rather a distribution of SOI values [Dranove (1987), Stearns (1987, ch. 3)]. While hospital expenditures in treating an illness are, in general, a non-decreasing function of SOI, a hospital is compensated at the same rate for each patient within a DRG. It follows that in treating some patients in some DRGs, a hospital can incur expected costs greater than the DRG payments.[6] Thus, one explanation for the observed dumping behavior of hospitals is that a profit-maximizing hospital has incentives to minimize the number of its high-cost admissions [Newhouse (1983, p. 269), Ellis and McGuire (1986), Dranove (1987)]. The foregoing discussion suggests that the main problem is that the technology for measuring SOI is not well developed [Horn and Sharkey (1983), Wolfe (1984, pp. 187–193)].[7] If the measurement technology were perfect, each DRG could be made homogeneous, and Medicare could compensate hospitals adequately for each level of severity treated. Presumably in such a situation no dumping would occur, even under a PPS regime.[8]

Technological inadequacy notwithstanding, commentators often adopt the tone that dumping is 'bad' [Relman (1985), Wrenn (1985)], that hospitals engaged in patient transfers are shirking their social responsibilities. But no one has as yet offered a criterion for determining that dumping is undesirable. In this paper, we offer an efficiency criterion for judging whether or not dumping is undesirable. An allocation is considered as efficient if it is

[5]The tremendous growth in home health agencies (104.4 percent from 1980 to 1986) is a consistent and related phenomenon [U.S. General Accounting Office (1988)].

[6]Although the DRG payments are set to cover average costs of each type of hospital, they may not cover average costs of a particular hospital, or average costs of certain DRGs within a particular hospital.

[7]One can view SOI as a continuous variable and a DRG as discrete, with the attendant problem of 'coarseness' in measuring a continuous variable with a discrete proxy.

[8]The regulation of hospitals is made more complicated because outputs of hospitals are heterogeneous, unlike gallons of water or kilowatt-hours of electricity produced by other regulated industries. The problem is further complicated by the endogeneity of hospital output [Grannemann et al. (1986, p. 109)]. It is thus difficult to assess or compare the outputs of different hospitals [Kalison and Averill (1984, p. 105)], and to set prices based on these outputs. Yet, the rationale for PPS is an assumption that interinstitutional differences in efficiency rather than differences in patient characteristics or in quality of care account for differences in cost of providing care [Stern and Epstein (1985, p. 622)].

obtained as a result of hospitals acting as if they were perfect agents of the patient. We interpret perfect agency to imply that the hospital chooses medical care to maximize the patient's utility [Pauly (1980, p. 5)] subject to the hospital's breakeven constraint [Harris (1979, p. 228)] and the patient's budget constraint (where applicable).[9] Then we attempt to show that even if hospitals acted like perfect agents of their patients in the sense defined above, some dumping could still occur.

According to our model, within each DRG, rational veterans with different levels of severity of illness will self-select into VA and non-VA hospitals according to their levels of severity. While the very severely ill may choose the VA, other eligible veterans choose non-VA hospitals. There are two reasons for this phenomenon. The first is that VA and non-VA hospitals operate under grossly different budget regimes, each better suited to patients with different levels of severity. On the one hand, the non-VA hospital faces the patient's budget constraint (or the prospective payment), often in addition to the hospital's breakeven constraint. On the other hand, a VA hospital can be assumed to operate under a global annual budget exogenously determined by the U.S. Department of Veterans Affairs. The second reason is that informational difficulties may prevent many patients from choosing their 'most-preferred' hospitals. A patient may end up in a 'wrong' hospital. If a wrong hospital acted like a perfect agent, it would transfer the patient to the patient's most-preferred hospital. Some of the transfers from a wrong hospital to a most-preferred hospital show up as part of observed dumping.

Section 2 presents empirical evidence that dumping from non-VA to VA hospitals[10] has, in fact, occurred; then in section 3 we construct a static non-stochastic model of a patient's demand for hospital inpatient care.[11] Then this model of demand is used to analyze the problems facing the patient if she chooses a non-VA (section 4) or VA hospital (section 5). In section 6 we derive conditions of severity of illness under which different hospital types become more attractive to particular patients relative to alternatives. It is

[9]A more appropriate hospital objective may be to maximize an aggregate of utilities of all its patients. Our main results would still hold. With our definition of perfect agency, there is no conflict in the objectives of the hospital and the patient. For the 'ideal' non-profit hospital, the objectives of the patient and the hospital can indeed be the same. Compare this definition of perfect agency with the definition in Ellis and McGuire (1986, p. 131) that the perfect agent values one dollar of hospital profit equally with one dollar of benefit to the patient.

[10]Our theoretical model is based on the heterogeneity of illness severity within a DRG, that is, hospitals tend to dump the more severely ill within a DRG. We cannot empirically ascertain this intra-DRG distribution of severity with available data. Hence, our empirical analysis uses the DRGs themselves as measures of severity. That is, whereas the theoretical hypothesis is that the relatively more severely ill patients within a DRG are dumped, the empirical evidence presented here is that patients in particular DRGs are dumped.

[11]Such a model is justified because dumping is a phenomenon of hospital inpatient care.

Table 1

VA discharges. ANOVAs: Mean percentage change in discharges per DRG in group, individuals 65+, all states 1982–1986, 1982 weights.

			F
Winner	*Neutral*	*Loser*	
53.3%	48.7%	135.5%	4.8[a]
Surgical	*Medical*		
45.0%	110.2%		5.7[a]
Not loser	*Loser*		
50.9%	135.5%		9.7[a]
Without complications	*No indicator*	*With complications*	
31.5%	51.5%	135.6%	6.4[a]

[a]Significant at 5% level.

shown that the preference for treatment at the VA can increase with increased severity of illness. The conclusion is in section 7.

2. Empirical evidence

One example of dumping is the shifting of severely ill veterans to the VA by non-VA hospitals. We present empirical evidence that elderly veterans in DRGs that are less likely to be profitable – complicated DRGs, medical DRGs, chronic DRGs, DRGs with higher variances, etc. – are more likely to have been treated in the VA system after the introduction of PPS than before its inception.[12]

Evidence of patient dumping is obtained by comparing VA hospital discharges prior to PPS (1982) and several years afer the introduction of PPS (1986). We also compare these VA hospital discharges to non-VA Medicare discharges over the same time period. [See Wolfe (1989) for a more detailed discussion of the approach and results.] We select 60 DRGs based on a profitability index [Mattice et al. (1989)]. Two types of analyses are conducted: (1) ANOVA analyses of weighted DRGs, where weights are based on discharges in 1982; (2) regression analyses, using a measure of riskiness of the 60 DRGs. All analyses show the same pattern – far more patients who could be termed 'more severely ill' or potential losers to non-VA hospitals were treated in the VA post-PPS than prior to PPS.

In the ANOVA analysis (table 1), the likelihood that patients are more expensive or pose greater cost risk to the hospital is measured in a variety of ways: those identified as loser DRGs (those with greater weights, those with greater variance, those with larger differences between the mean and median,

[12]A question arises as to whether a VA hospital placidly accepts all the severely ill veterans that are dumped on it. Apart from the priority given to category A veterans, admission decisions are left to the discretion of individual VA hospitals.

those with bigger differences between predicted mean length of stay and actual length of stay, and those with more patients who either died under hospital treatment or were transferred to skilled nursing homes); those in DRGs which are defined as having complications; those that are medical rather than surgical DRGs (in this case, medical DRGs have greater variance in treatment compared to surgical DRGs which tend to be more homogeneous). In all of these riskier DRGs where the hospital is more likely to incur a loss, there is a substantial increase in patients treated in VA hospitals. As shown in table 1, the difference in the percentage of cases treated in the VA in 1986 relative to 1982 is significantly different comparing the less risky (less unprofitable) cases with the riskier cases. Since this shift might instead reflect a changing pattern of illness or of technology, the same analysis was done using Medicare data. These results (available from the authors) do not, in general, show a similar pattern, but rather suggest (a) a smaller increase in the number of patients treated overall in the Medicare system relative to the VA system, and (b) no significant difference in the pattern of changes in treatment of riskier or less profitable patients compared with other patients.

The regression analysis uses VA data over the same pre-post DRG period 1982–1986. Two measures of riskiness of treatment to the hospital's financial position are used: variance of DRG costs and a measure of severity in a DRG – the proportion of patients who died while hospitalized plus the proportion of patients in each DRG discharged to skilled nursing homes. Since a VA hospital treats both non-elderly (less than 65 years of age) and elderly patients, but only the elderly are eligible for Medicare coverage,[13] an additional variable is included to differentiate those eligible for both systems (VA and Medicare) and those veterans not eligible for Medicare coverage. The results (table 2) again provide evidence of dumping. The VA treated far more patients in DRGs with greater variance in 1986 compared with 1982; the VA treated substantially more patients in DRGs with more patients who either died during treatment or were transferred to skilled nursing homes from hospitals in 1986 than in 1982, or in the post-DRG period than prior to the enactment of the DRG system.[14] Both types of analyses then provide

[13]This statement is only partially correct since Medicare also covers some non-elderly persons who have received Social Security Disability pensions for two years, and others on end-stage renal dialysis. A test to include a proxy measure for this – a dummy variable to capture those who receive veteran's disability pensions – did not influence the reported results.

[14]An alternative specification that included two additional variables is fully consistent with the reported results. The additional control variables were the percentage of for-profit hospital beds in a state and a dummy variable indicating that the state is a rate-setting state. The first is intended to capture additional motivation to shift patients who are riskier. The coefficient is positive and statistically significant in each of the specifications. The rate-setting variable is to capture additional pressure from cost-control regulations that are also expected to increase pressure to shift potentially unprofitable patients. The coefficient on it is positive but it is not statistically significant in these equations at the 5 percent level.

Table 2

Regression results. Percentage change in discharges by DRG, 1982–1986 (state as unit of measurement).

Constant	1.96 (0.6)	1.80 (0.6)
Ages 65+	9.27 (0.9)[a]	8.94 (0.8)[a]
% Died + transferred to SNH		4.43 (0.4)[a]
R^2	0.03	0.05

Note: Standard errors are in parentheses; adjusted for heteroskedasticity using White's adjustment. Dependent variable is difference in discharges, 1982–1986.

[a]Statistically significant at 5% level.

evidence consistent with patient dumping from the Medicare-reimbursement system to the VA system in the post-PPS era. The increased probability of admission to the VA of patients in 'loser' DRGs and riskier DRGs is taken as evidence of dumping by non-VA to VA hospitals. Dumping of the more severely ill patients within a DRG follows logically because the same incentives exist for the hospital to minimize the number of its high-cost admissions both inter-DRG and intra-DRG.

3. The patient

Patient dumping is a phenomenon of hospital inpatient medical care; hence we begin with a model of a patient's demand for inpatient care. The demand for hospital inpatient care depends on whether or not the individual is sick [Arrow (1963, p. 948)], and on how sick she is. Inpatient care is curative; it is demanded only if the patient is sick and desires to be healthy. In general, the more severely ill (or sicker) the patient, the larger the expected amount of medical care require to 'cure her'. A fuller development of this idea of curative medical care can be found in Eze (1991).

Consider a single time period. Let η represent the magnitude or severity of the patient's illness (SOI). Imagine that the patient has an ex ante (prior to medical care consumption) SOI η_0, and an ex post SOI η. The person is sick if $\eta_0 > 0$; she is healthy if $\eta_0 = 0$. Let M be the patient's medical care utilization. Medical care is utilized only if $\eta_0 > 0$. Let $h(M)$ be her health production function [Grossman (1972, p. 226)]. We assert that

$$\eta = \eta_0 - h(M), \quad \eta_0 > 0, \ \eta \geqq 0, \ h' > 0, \ h'' < 0. \tag{1}$$

The purpose of medical care is to 'cure' the person's sickness; that is, to

make $\eta=0$.[15] From (1), the more severely ill the patient (the higher η_0) the more care required for cure, and the more medical care demanded, other things equal. The patient is assumed to have a state-dependent utility function U. If she is healthy, that is, if $\eta=0$, then

$$U=U(C), \quad U_c \geqq 0,\ U_{cc}<0, \tag{2}$$

where $C \geqq 0$ is the individual's non-medical consumption. In this case, her demand for inpatient care is zero. If she is sick, that is, if $\eta>0$, then

$$U=U(C,\eta), \quad U_c>0,\ U_{cc}<0,\ U_\eta<0,\ U_{\eta\eta}<0,\ U_{c\eta}<0. \tag{3}$$

We consider only sick persons since curative care is, by definition, demanded only by sick persons. A sick patient is defined as one for whom $0<\eta<\eta_d$, where η_d is the severity of illness at which death occurs. If there are no institutional barriers, a fully informed patient chooses C and M to maximize $U(C,\eta)$ subject to budget constraints that depend on her choice of hospital.[16] In reality, there are institutional, informational and other barriers to the patient's choices. It is the patient's need for a hospital to help her carry out the utility maximization that generates the agency relationship between the patient and the hospital. If the hospital acted like a perfect agent of the patient, it would maximize the patient's utility subject to appropriate constraints.

4. Non-VA hospital

Suppose that the patient is fully informed and there are no institutional barriers to choice. Suppose also that the patient chooses to receive hospital care at the non-VA hospital rather than at the VA. What optimization problem does the patient face?

Consider a non-profit, non-VA hospital with the objective of providing the most care for its patients. Prior to the introduction of PPS, the non-VA hospital operated under a fee-for-service budget regime. Medicare reimbursed the hospital fully for medical care utilized by the hospital's Medicare

[15]The amount of medical care required to make $\eta=0$ is the person's medical care 'need' [Boulding (1966)]. The demand for inpatient care can be viewed as an optimal stopping problem. The individual stops utilizing care once she is healthy (or dead). This is the case especially because iatrogenic and nosocomial effects can exceed the health-improving effects of additional care.

[16]The fully-informed patient chooses not only the consumption commodities but also the institutional form of the medical care provider. The optimal choices of C and M may depend on whether medical care is received at a VA or a non-VA hospital.

patients. The hospital's breakeven constraint was non-binding.[17] Thus, the problem facing a patient at a pre-PPS non-VA hospital is

$$\max_{c,m} U(C,\eta) \tag{4}$$

$$\text{s.t.} \quad \eta=\eta_0-h(M), \tag{5}$$

$$C+pM=W, \tag{6}$$

where M is medical care utilized by the patient at the non-VA, and p is the marginal cost (or price) of M to the patient.[18] W is the individual's income (or wealth), and C is the numeraire good. Let M^{**} be the solution to the above problem. Let $U^{**}(\cdot)$ be the utility obtained at the non-VA by the patient utilizing M^{**}.

With the introduction of PPS, Medicare reimburses the hospital at a predetermined rate q_j for each patient in DRG j. Considering only DRG j and dropping the subscript j, the hospital's total revenue (TR) is

$$TR=Nq+\sum_{n=1}^{N} pM_n, \tag{7}$$

where N is the number of the hospital's Medicare patients in DRG j, and n is a 'dummy' variable. Let $c(M_n)$, $c'>0$, $c''>0$, be the cost incurred by the hospital in treating patient n. Under PPS, if $c(M_n)>q+pM_n$, the hospital bears the loss. The hospital's total cost (TC) is

$$TC=\sum_{n=1}^{N} c(M_n). \tag{8}$$

The hospital's breakeven constraint is $TC=TR$,[19] or, equating (7) and (8):

$$\sum_{n=1}^{N} c(M_n)=Nq+\sum_{n=1}^{N} pM_n. \tag{9}$$

[17]Dumping was not a problem in this case because there was no conflict between the objectives of the hospital and those of the patient [Jacobs and Wilder (1984), Ellis and McGuire (1986, p. 131)].

[18]The amount pM can be interpreted as representing all the out-of-pocket (deductibles and coinsurance) amounts paid by the patient. Except for physician bills and certain amenities, Medicare does not permit hospitals to charge Medicare patients beyond the deductibles and coinsurance amounts.

[19]In general, the breakeven constraint ($TR=TC$) does not need to hold for each DRG. There can be some subsidization of loser DRGs with excess revenues from charity, profitable DRGs and other payers, in which case the breakeven constraint would have to be modified accordingly. Our main point is that the constraint is tighter under the DRG regime than prior.

Under PPS, the problem facing the patient who chooses the non-VA hospital is the following (considering patient i):

$$\max_{c_1, m_1} U(C_i, \eta_i), \tag{10}$$

$$\text{s.t.} \quad \eta = \eta_0 - h(M_i), \tag{11}$$

$$C_i + pM_i = W, \tag{12}$$

$$\sum_{n=1}^{N} c(M_n) = Nq + \sum_{n=1}^{N} pM_n. \tag{13}$$

Let M^* represent the solution to the above PPS problem. Let $U^*(\cdot)$ be the utility the patient derives from the non-VA by the patient consuming M^* in the PPS regime.

The introduction of PPS adds a breakeven constraint to the patient's maximization problem. By the Le Chatelier principle [Silberberg (1978, pp. 293–298)], because of the extra constraint, the patient would not prefer the allocations in the PPS regime to those in the fee-for-service regime,[20] other things equal. Hence

$$M^{**} \geqq M^*, \tag{14}$$

$$U^{**}(\cdot) \geqq U^*(\cdot). \tag{15}$$

5. VA hospital

Suppose that the informational and institutional conditions in section 4 persist. Suppose also that the patient chooses to receive care at a VA hospital. What is the patient's optimization problem?

Imagine that the VA operates on an exogenously determined annual budget G (measured in units of medical care). Assume that all VA patients are in Category A and also that they all are in the DRG. Since all the patients have a right to treatment, if N veterans seek care at the VA hospital, they all have to be taken care of with the budget G. Let the patient's share of the VA budget be g; g is not in the patient's choice set. In general, the

[20]With PPS, hospitals responded by decreasing length of stay and intensifying care during the remaining (fewer) days. This increased the Medicare deductible substantially since it is set to equal the average cost of a hospital inpatient day.

number of veterans, N, seeking care at a VA hospital is not known before the annual budget, G, is set; N is a random variable. Therefore, g is random.[21] For simplicity, we assume that g is known with certainty and is the same for all patients in the same DRG. The problem facing a VA patient is

$$\max_{c} U(C,\eta) \tag{16}$$

$$\text{s.t.} \quad \eta=\eta_0-h(g), \tag{17}$$

$$C=W, \tag{18}$$

where the budget constraint (18) results from the fact that the VA is free.[22] Let the utility obtained at the VA by a patient who solves the above problem be $U^+(C,g)$. Note that

$$U^+(\cdot)=U[W,\eta_0-h(g)]; \tag{19}$$

from the patient's viewpoint, all arguments of $U(\cdot)$ are parameters and constants.

6. Consumer's choice

Two questions are analyzed in this section. First, what type of patient tends to be transferred to (or dumped on) VA hospitals? To answer this question, the breakeven constraint, (13), is rewritten as

$$\frac{1}{N}\sum_{n=1}^{N} c(M_n)=q+p\frac{1}{N}\sum_{n=1}^{N} M_n, \tag{20}$$

$$\bar{c}=q+p\bar{M}. \tag{21}$$

Consider a patient for whom $c(M_i)\leqq\bar{c}$. If all of the hospital's patients are of this type, the breakeven constraint would be non-binding; the solution would be the same as in the pre-PPS regime. It is reasonable to conclude that dumping can occur only if the breakeven constraint is binding. Even then

[21]This randomness of g may help explain why the 'dumped' patients did not seek care at the VA initially.

[22]There are numerically more non-VA than VA hospitals. Hence, one would expect a non-VA to be closer than the VA to the patient's residence. Thus, the VA patient's budget constraint may more likely be $C=W-d$, where d is a travel cost from the patient's residence to the VA hospital (relative to a non-VA hospital).

dumping occurs primarily among the more severely ill, for whom $c(M_i) > \bar{c}$.[23] Loser DRGs can be regarded as those DRGs with patients such that $\sum_{n=1}^{N} c(M_i) > N\bar{c}$.

The second question is: What type of patient would prefer VA to non-VA hospitals? We attempt to show that the more severely ill patients (those with higher η_0) tend to prefer the VA. That is, the patient's relative preference for the VA increases with severity of illness. The patient prefers the VA hospital in the PPS regime if

$$Z \equiv U^+(W, \eta_0 - h(g)) - U^*(W - pM^*, \eta_0 - h(M^*)) > 0, \tag{22}$$

where Z is a measure of the patient's relative preference for the VA.[24] To make more specific inferences from eq. (22) we assume a specific functional form for the utility function U:

$$U = AC^{\alpha} - B\eta^{\beta}, \quad A, B > 0. \tag{23}$$

Then inequality (22) becomes

$$AW^{\alpha} - B[\eta_0 - h(g)]^{\beta} - A(W - pM^*)^{\alpha} + B[\eta_0 - h(M^*)]^{\beta} > 0, \tag{24}$$

$$A[W^{\alpha} - (W - pM^*)^{\alpha}] - B\{[\eta_0 - h(g)]^{\beta} - [\eta_0 - h(M^*)]^{\beta}\} > 0. \tag{25}$$

Note that the first term in (25) is non-negative. There are two conditions under which the inequality in (25) holds: (a) $g \geqq M^*$, the individual can get more care at the VA; (b) $g < M^*$, but the first term in (25) is larger than the second term in absolute value; even though the patient can obtain less medical care at the VA than she could at the non-VA, the patient prefers the VA hospital because it is less expensive for her. This may suggest also that poorer veterans prefer VA hospitals, relatively.

We show next that the relative preference for the VA increases with severity of illness. That is, to show

$$\frac{dZ}{d\eta_0} = \frac{d(U^+ - U^*)}{d\eta_0} > 0. \tag{26}$$

Substituting eq. (22) into eq. (26) gives

$$\frac{\partial Z}{\partial \eta_0} = U_{\eta}^{+} - U_{\eta}^{*} > 0?, \tag{27}$$

[23]Even if a hospital subsidized more severely ill patients with excess revenue from the less severely ill, the hospital cannot afford to have 'too many' of the more severely ill patients if it is to satisfy its breakeven constraint.

[24]Increased preference for the VA in the PPS regime is equivalent to $(U^+ - U^*) \geqq (U^+ - U^{**})$ which is equivalent to eq. (15), $U^{**} \geqq U^*$.

where $U^i_\eta \equiv \partial U^i/\partial \eta$, etc.[25] From eq. (23),

$$U_c = \alpha A C^{\alpha-1} > 0, \qquad U_{cc} = \alpha(\alpha-1) A C^{\alpha-2} < 0, \tag{28}$$

if $0 < \alpha < 1$. Also,

$$U_\eta = -\beta B \eta^{\beta-1} < 0, \qquad U_{\eta\eta} = -\beta(\beta-1) B \eta^{\beta-2} < 0, \tag{29}$$

if $\beta > 1$. Substituting from (28) and (29) into (27) gives

$$-\beta B[\eta_0 - h(g)]^{\beta-1} + \beta B[\eta_0 - h(M^*)]^{\beta-1} > 0?. \tag{30}$$

In the special case in which $\beta = 2$, expression (30) becomes

$$2B[h(g) - h(M^*)] > 0?. \tag{31}$$

Inequality in (31) holds if $g > M^*$. In this case, a patient's relative preference for the VA increases with the severity of the illness.

7. Conclusion

In this paper we show analytically that under a non-profit structure, a hospital facing a breakeven constraint has an incentive to reduce the number of its high-cost admissions. This implies that some high-cost patients will be 'dumped'. Moreover, there are conditions under which a patient may prefer a VA to a non-VA hospital. Such preferences may increase with severity of illness. To the extent that hospitals help sort patients according to the patient's preferences, dumping is not necessarily inefficient. Zero shifting is not necessarily efficient.

This paper is not intended to suggest that all dumping of severely ill patients is efficient nor to lend intellectual justification for the behavior of hospitals that dump patients. Rather our intention is to call attention to the need for clear definitions of concepts and terms used in debates on health care. Anyone acquainted with an exchange between Relman and Reinhardt (1986) (a physician and an economist, respectively) knows how the debate can be lost in confusion about concepts and terms. Within the economics profession, much can be gained from clear definitions.

This paper offers one definition of an efficiency criterion which seems appropriate for considering the issue of patient dumping. The efficiency criterion offered here may or may not be Pareto. The hospital is not a social planner, but only the patient's agent [Fuchs (1970), Fitzgerald (1984), Ellis

[25]Eq. (27) is obtained by applying the envelope theorem [Silberberg (1978, pp. 170–171)] to (26).

and McGuire (1986, p. 131)].[26] As such, there is no reason to expect the hospital to choose socially optimal allocations [see Pauly (1980, p. 8)]. To the extent that a hospital acts like a perfect agent of the patient, the resulting allocations are efficient (in the sense that the hospital is doing what it is supposed to do). If society wants hospitals to choose socially optimal allocations, society needs to set hospital incentives accordingly. An appropriate choice of incentives may require an explicit indication of social objectives, without which it is difficult to ascertain the social benefits of any pattern of care and patient shifting.

Data appendix

The data used in the empirical analysis are primarily from the 1982 and 1986 Department of Veterans Affairs Patient Treatment Files. The treatment files are based on discharges and contain information on procedures performed, diagnosis, race, age, veteran's status, veteran's state of residence, and place where care was performed. The full set of persons discharged in 60 DRGs was obtained; these were 148,596 and 183,244 for fiscal years 1982 and 1986, respectively. The records were aggregated to the state level for DRG for two groups; those under 65 and those 65 years of age and older. For comparison, Medicare discharge data were used also. For 1982, these are from the National Hospital Discharge Survey, while for 1986, they are from the Health Care Administration Medicare data files.

For the ANOVA analysis, we used a weighting scheme to ensure that a small change in discharges from a DRG with a small number of discharges in 1982 does not unduly influence the results. The weight for each DRG is simply the number of discharges in 1982 divided by the total number of discharges in 1982. The weights sum to 1. For the regression analysis, the unit of analysis is the change in the discharges for each DRG, by state, by the under 65 and over 65 categories.

In selecting the 60 DRGs, we first exclude DRGs not relevant to the VA (those relating primarily to women or children); minor DRGs [see Mattice et al. (1989)]; trauma and burn cases that cannot be treated by the VA generally; heterogeneous or garbage DRGs that capture patients who cannot be otherwise assigned; DRGs that underwent major changes in definition over the 1983–1986 period; DRGs where there was evidence of major changes in coding in the VA that would influence the number of discharges in the VA. This left 127 DRGs. We then selected approximately half of these. See Mattice et al. (1989) for details.

The information on DRGs used to categorize the DRGs are from

[26]Ellis and McGuire (1986) state that prospective payments provide the right incentives to maximize social welfare only if the physician is a 'perfect agent'. This statement is not right inasmuch as society contains more than just the physician and the patient.

published Health Care Financing data for 1983–1986 and are based on Medicare data.

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