The Internal Organization of Hospitals: Some Economic Implications

Jeffrey E. Harris

The Bell Journal of Economics, Vol. 8, No. 2. (Autumn, 1977), pp. 467-482.

Stable URL:
http://links.jstor.org/sici?sici=0361-915X%28197723%298%3A2%3C467%3ATIOOHS%3E2.0.CO%3B2-6

The Bell Journal of Economics is currently published by The RAND Corporation.

The internal organization of hospitals: some economic implications

Jeffrey E. Harris

Assistant Professor of Economics
Massachusetts Institute of Technology

This paper investigates the economic implications of the hospital's internal organizational structure. It concludes: (1) The hospital is actually two separate firms—a medical staff (or demand division) and an administration (or supply division). Each half of the organization has its own managers, objectives, pricing strategies and constraints. (2) Within this dual organization, the medical staff and administration have devised a complicated system of nonprice allocative rules. (3) This internal allocative scheme is subject to repeated breakdowns, especially when the medical staff's internal demands exceed the short-run capacity supplied by the administration. (4) Our current regulatory policy toward hospitals is almost exclusively directed at the supply side of the organization. Unless we revise our definition of "hospital" to include the doctor part of the firm, this policy is doomed to failure. (5) Ultimately, a rational public policy toward hospitals requires a change in the internal organization of the hospital itself.

1. Introduction

■ Economists frequently point out our lack of an adequate economic theory of the hospital. Those simple models which have been proposed do not seem to capture the essential institutional details or have great predictive power. The hospital has so many complicated features—the absence of equity capital, an abundance of regulatory controls, near complete insurance subsidization, to name a few—that no single overriding principle fits all the facts. Certainly, many of these characteristics also apply to ordinary business firms, and the conventional theory has been criticized for similar reasons. But the hospital appears to be an extraordinary case.

The hospital is special, this paper suggests, because it is actually two firms in one. There is one part run by doctors and another run by hospital administrators. This split in authority has been emphasized repeatedly in the organizational literature.[1] But it remains the source of considerable confusion in existing economic models. In some versions, doctors are regarded as independent entrepreneurs separate from the hospital. In others, they are assumed to be subordinate to

The author is also a Clinical Fellow, Medical Services, Massachusetts General Hospital. Important criticisms by P. Diamond, P. Samuelson, R. Solow, P. Temin, M. Weitzman, T. Willemain, and the Editorial Board are greatly appreciated.

[1] For some earlier references, see Smith (1955), Henry (1960), and Perrow (1963). More recently, see the contributions in Georgopoulos (1972).

the administration and trustees. In others, doctors have *de facto* control over the administration. Sometimes, the entire question of the identity of the firm's decisionmaker is avoided.[2]

My task in this paper is to begin to make some sense out of this confusion. I shall ask some basic questions about internal resource allocation and internal conflict resolution which, hopefully, will be reflected in future models of the hospital. It turns out that this organizational schizophrenia has considerable importance for our current public policy approaches to the hospital sector.

My main conclusions are as follows:

> (1) There is an important ambiguity in the relation between doctor and hospital in this country. On the one hand, the physician is a specialized member of a complicated, decentralized "fire-fighting" organization. On the other hand, the doctor-patient relation renders the physician's medical practice contractually separate from the rest of the hospital. The net result is one organization split into two disjoint pieces, each with its own objectives, managers, pricing strategy and constraints.
>
> (2) Within this organization, the medical staff and administration are locked in a noncooperative oligopoly-type game. This internal foray is resolved not by strategic bargaining at a *joint conference committee, but through the short-run internal* allocation process itself. Frequently, the only way to resolve conflicts over the control of hospital capacity is for the firm to get bigger and more complicated.
>
> (3) Our current regulatory policy toward hospitals is too one-sided. Attempts to control expenditures or restrict the supply of investment funds to hospital administrators without accompanying incentives at the level of the physician-patient relation will lead to queues, bitterness, and bad medical care.
>
> (4) As an alternative, we must devise policy measures directed jointly at both halves of the organization. Ultimately, this means a change in the internal organization of the hospital itself.

After this introduction, Section 2 discusses the complexity of the internal allocation problem in hospitals. Section 3 considers the reasons for the institutional separation of doctors and hospital in this country. Section 4 discusses the interplay between medical staff and administration in determining short-run capacity levels. Section 5 considers some policy implications.

Any discussion of this type must confront the fact that a very special ethical tone pervades the hospital. Business as usual in hospitals is, after all, a continuous sequence of potential crises. I do not want to exploit or dissect the "myth of uniqueness" surrounding medical care. But it should be understood that the organization is set up to protect the doctor from behaving as economic man. Some might regard this as a mere artifact of the insurance system. Others would elevate it to the level of ideology. Whatever, it cannot be ignored in the analysis.

[2] For critical analyses of existing models, see Feldstein (1974) and Jacobs (1974). See also Newhouse (1970), Feldstein (1971), Lee (1971), Clarkson (1972), Davis (1972), Manning (1973), Pauly and Redisch (1973).

2. The internal coordination problem

■ The hospital is a firm specifically designed to solve a complicated decision problem—the diagnosis and treatment of illness. Because of the uncertainty inherent in human disease processes, this task requires an organization which can adapt rapidly to changing circumstances and new information. In this section, I emphasize: (1) hospitals have developed a specialized system of very short-run internal resource allocation to handle this coordination problem; and (2) this allocative scheme forms the basis for the split organizational structure characteristic of hospitals in this country.

□ **The diagnosis and treatment of illness.** For heuristic purposes, consider the following hypothetical case history:

> Mr. X comes to Dr. A with a fever and a cough. A chest X ray reveals a density. He is hospitalized. Penicillin is administered. Although the fever subsides with this treatment, a repeat X ray shows that the density has not disappeared. A sputum cytological examination is performed and lung cancer is diagnosed. Further studies suggest that the cancer can be removed surgically. An operation is performed. Unfortunately, massive postoperative bleeding occurs. Matched whole blood is administered. Despite this treatment, a cardiac arrest ensues and an emergency resuscitation (code call) is announced. Mr. X is transferred to Intensive Care with chest tubes and a respirator. A special contrast study (angiogram) reveals the site of bleeding. A repeat operation is performed.

In this story, Mr. X's doctor did not just figure out the correct diagnosis and then apply the appropriate treatment. Instead, Mr. X's hospital care involved a complicated sequence of adaptive responses in the face of uncertainty.

All necessary actions taken by Dr. A were obviously not spelled out before Mr. X's hospitalization. Dr. A could have suggested to Mr. X that the X ray density might be cancer, but the number of necessary units of blood required for his postoperative hemorrhage was not predictable in advance. What Mr. X bought was not an operation or blood, but a more general guarantee to be given appropriate medical care whatever his fever and cough turned out to be. In this situation, neither Dr. A nor Mr. X can know at the start the price of the package Mr. X is buying. And once the promise is entered into, it becomes very difficult to stop when the cumulative price reaches some fixed amount. This implicit promise is as much a part of the doctor-patient "contract" as any specific therapeutic measure.

This is not to deny that each of Mr. X's problems had a textbook treatment. For many routine hospital cases, in fact, the actual course of action does not vary much from that planned initially. But the point is that any medical problem can have numerous idiosyncrasies. Not every case of lung cancer presents with pneumonia. Mr. X could have been penicillin-allergic. He might have had diabetes as well. In principle, the complete set of actions required to care for Mr. X was potentially different from that of any other patient.

Moreover, failure to take the necessary actions at precise times and in an exact order could have disastrous consequences. Matched whole blood was required for Mr. X only in the minutes and hours after bleeding. Mr. X's code call (emergency resuscitation) was necessary only at the time of his postoperative cardiac arrest. This does not apply just to emergencies. Even the penicillin had to be given at certain time intervals and dosages.

This "fire fighting" aspect of hospital care is critical to the firm's

organization. In contrast to the standardized assembly line production process, each patient receives customized attention. Such a regime of special cases requires a considerable degree of decentralization of decision making.

Any organization designed to care for Mr. X must obviously have a certain amount of standby capacity. But in the hospital, this is not merely a matter of stocking the appropriate physical inventories. Mr. X's emergency resuscitation involved highly specialized human inputs. As a component of his medical care, the code call had to be organized just at the time it was required. Even the task of providing a chest X ray on demand required that a technician and radiologist be available to take, develop, and interpret the picture. And since many services are specially adapted to the particular patient (for example, whole blood thawed and cross-matched for Mr. X), they are not always substitutable from one patient to another.

I do not want to give the impression that every aspect of hospital care involves fixed coefficients. There is a putative set of scientific standards which serve to define the minimum acceptable level of each medical input. But exceeding that minimum is not the same as failing to satisfy it. How far it is exceeded has something to do with the "quality" of medical care the patient receives. If Mr. X bleeds, then his blood pressure and blood count must be checked frequently, but he gets better care if they are watched even more frequently. Although Mr. X stabilized after his repeat operation, he might be better off staying in the intensive care unit another day. The real problem is that in a decentralized regime of special cases, it may be operationally impossible for anyone but the patient's doctor to determine where these minimum cutoff points lie. As a result, production must be organized *as if* every input received by the patient is potentially an absolute necessity. I shall return to this point below.

□ **The split organization:** To solve these coordination problems, the hospital has developed a characteristic division of labor. This division of labor does not in general depend on the type of hospital ownership (nonprofit, proprietary, government, etc.). The idea is basically this. The firm is made up of an array of specialized suppliers and demanders. On the supply side, certain functionally-oriented departments, such as the pharmacy, operating rooms, and blood bank, stand ready to assemble and deliver a particular input. These inputs are called "ancillary services" and the suppliers are called "ancillary departments." On the demand side, various doctors such as Dr. A decide which patients need which ancillary services and when. Thus, Dr. A recognized the need for sputum cytology and ordered it, and in response the pathology department supplied it. Then Dr. A ordered an operation, and the operating room department made a surgical suite and technicians available. Then postoperatively, an angiogram was ordered and the radiology department performed the service, and so on. The patient care process becomes, in effect, a sequence of spot demands and deliveries.

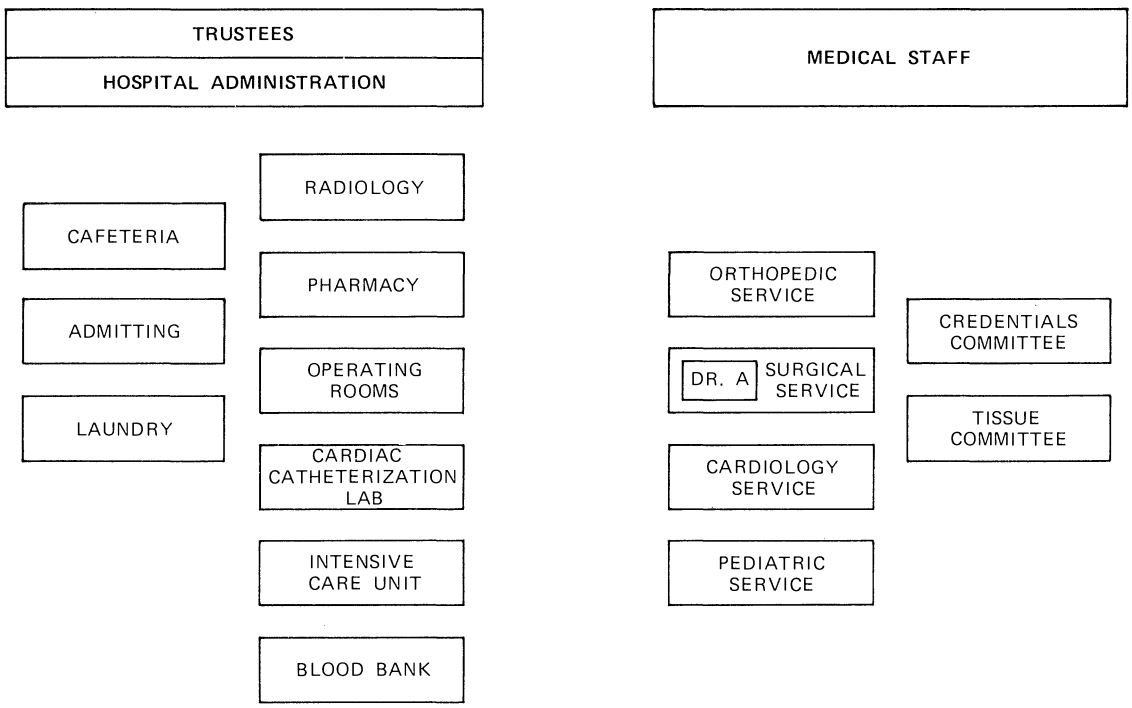
This separation of internal supply and demand functions is really what distinguishes the hospital from other forms of physician enterprise. In a solo or group office practice, for example, the doctor serves to a great extent as both the patient's medical decision maker and as the manager of the firm's inputs. But in the hospital, the supply

function has become too specialized for doctors to handle by themselves. Hence, when Dr. A ordered an X ray, he did not also purchase and stock the film. Nor did he hire the radiological technician, finance the equipment, or plan for the availability of these inputs on demand. Dr. A's decision that Mr. X needed a particular test created an internal demand for that ancillary service, which someone else in the firm then supplied—namely, the hospital's administrator.[3]

This separation of functions is reflected in the formal "organization chart" of the hospital (see Figure 1).[4] The typical voluntary

FIGURE 1

HOSPITAL ORGANIZATION CHART



hospital, for example, is a nonprofit corporation with a board of trustees as its ultimate authority. Although the trustees delegate operating responsibility to the hospital's administration, there is also a second separate line of authority emanating from the medical staff, which constitutes the hospital's affiliated physicians. The exact de-

[3] For certain medical inputs, doctors are also suppliers. Dr. A (or possibly a surgical consultant) both ordered and performed Mr. X's operation. But the operation could not have taken place unless an operating room, sterile equipment, and scrub nurses were also supplied. It is the physician's decision making role, not his technical skill, which is the critical factor here.

[4] The voluntary hospital, the most prevalent type in this country, will be discussed here. Figure 1 is a stylized version of the organization chart required by the Joint Commission on Accreditation of Hospitals. To adapt the Figure to proprietary or government hospitals, it would be necessary to replace the Trustees (sometimes called the Governing Board) with some alternative form of ownership arrangement. However, in all but the smallest hospitals, this basic organizational split prevails. For an example of a more complete hospital organization chart, see American Hospital Association (1969, p. 7).

partmental divisioning of the administration and the accompanying hierarchy varies among hospitals.[5] The important point is that the administration does not make patient care decisions. The information it uses to plan capacity for ancillary and support services is derived basically from the set of internal demands of individual doctors.[6]

The organization of the medical staff also varies considerably among hospitals. It is usually divided into "clinical services" according to the specialty branches of the member physicians, e.g., Dr. A belonged to the surgical service. There is often no clear hierarchy of physicians. There may be a full-time chief of the medical staff and various department heads and executive committees, but their authority is quite variable. Sometimes a medical staff member is appointed to the trustees. Sometimes there is a "joint policy committee" of medical staff and trustees, which is designed to bring the two lines of authority together on matters of long-run strategy.[7]

3. The doctor-hospital problem

■ In this section, I emphasize that the two-part organization of Figure 1 is actually an extreme and unusual case. For all intents and purposes, the typical hospital is two firms loosely connected by a complex set of nonmarket relations. The basis for this extreme organizational split is the special relation between the doctor and the hospital.

The mere fact that an organization has two parts is not by itself very unusual. Many service organizations have similar division of labor. A large-scale auto repair shop, for example, may have separate service and parts divisions. In the service division, an auto mechanic fixes up cars much like Dr. A "fixed up" Mr. X. And when the mechanic needs a particular gadget, he orders it from inventory just as Dr. A ordered penicillin from the pharmacy. What then is the difference?

If we consider only uncertainty and technological complexity, then our image of the doctor is that of a specialized decision maker in a very decentralized organization. In fact, there would be every reason to think of the doctor as an employee-specialist tied to the hospital in some sort of continuous supply arrangement.[8] To fulfill his contract to take care of Mr. X, Dr. A needed assured access to the hospital's

---

[5] In addition to the ancillary departments, the administration has operating responsibility for an array of support services such as admitting, housekeeping, cafeteria, etc. These are not formally considered ancillary services, as they are generally supplied to all hospital patients and not specifically ordered by doctors. Also, some nursing functions are considered to be part of the basic service package rather than as ancillary services, even though doctors' orders routinely include instructions for specific nursing activities.

[6] Some ancillary departments are headed by physicians. This is especially the case for radiology, anesthesiology, and pathology, where, as a rule, these doctors do not admit their own patients. There are also some interesting cases where practicing physicians are ancillary department administrators. The role of these physicians in the organization will be discussed in Section 4 below.

[7] In much of the organizational literature, the trustees are thought of as a third line of command separate from the administration. Frequently, the nursing staff is considered a fourth dominant group. Sometimes the chief executive in the administration is an M.D. I am abstracting away from these complicated institutional considerations to focus on the critical separation of the medical staff and the rest of the hospital.

[8] The parallel with university faculty is obvious.

ancillary services. It would be difficult to imagine how Dr. A could treat Mr. X if he had to enter into a market sales arrangement for every angiogram or code call.

Anyone who has ever been seriously ill, however, knows that something else is going on. Whatever this "something else" is, it is an ethical factor quite apart from the doctor's legal status as a professional. The doctor-patient relation creates a much stronger expectation of fidelity than is present in other agent-client arrangements.[9] The doctor is saddled with a moral burden of ultimate responsibility for the outcome of the case.

In a sense, Mr. X regarded his doctor as his own professional "gun for hire."[10] As an implicit part of his contract, Dr. A was supposed to take a single-minded devotion to his assignment. He was expected to do everything which was *scientifically indicated* for his patient without reference to price. By contrast, negotiations between a car owner and mechanic usually go to some length to specify an exact price—or at least a maximum price—for the job. The mechanic is much more a member of the auto repair business than a professional agent for his client. Dr. A, however, was supposed to be on Mr. X's side.

I am not saying that doctors ignore the magnitudes of their own fees or their patients' abilities to pay them. On the contrary, one function of the fee-for-service system is to seal the ethical bond between the doctor and patient. I am also not saying that doctors are prevented from ever making informal inquiries about the costs of nondoctor inputs. My point is that no patient such as Mr. X would want his doctor to be compelled to make repeated marginal decisions about the costs and benefits of an angiogram or unit of blood. People who are seriously ill do not want doctors who are cost-effective agents of the organization or of society. That would dilute the doctor's role as a paladin.

Many readers, I suppose, would argue that this is purely an artifact of the insurance system. Admittedly, if consumers were totally ignorant about cars and had full insurance for car repairs, then they might let mechanics do what doctors do. I must emphasize, however, that there is an unusual feature to this agency relationship. Even if Mr. X had full knowledge and no insurance, there would still be some social requirement for an agent who could make noneconomic decisions on his behalf. There is a special negative externality in an arrangement in which one makes repeated marginal decisions about life and death. This externality is so important that the physician's participation in the "market" for angiograms and code calls is explicitly foreclosed. Whether or not it is justified, this notion has an important influence on the way the hospital is organized.[11]

The net effect of all this is a sort of contracting dilemma. The patient buys a promise from the doctor to be fixed up. The hospital in turn (that is, the administration part) supplies the necessary inputs to the doctor. The technology of hospital care is such that the doctor and the hospital must be closely linked. On the other hand, there is a

[9] For an earlier reference to this point, see Arrow (1963).

[10] The analogy is from Halberstam (1971).

[11] One might ask whether this special ideology prevails in other countries. It seems to me that the closer relationship between doctors and hospitals found in many parts of Europe is traceable to a weakening of this ideology.

strong ethical presumption that the doctor be left alone to do whatever is necessary for the patient's well being. Somehow, the doctor must be isolated from the rest of hospital, even though he is really a part of it.

This problem is solved by setting up a separate contract between the patient and the hospital-supplier. Rather than buying the doctor's and the administration's services together in one package, the patient buys the two separately. This is not just a matter of Mr. X's getting a breakdown of "labor" and "parts" costs. Dr. A is not even supposed to get involved in the sale to Mr. X of the hospital-supplied operating room, penicillin, and X rays. It is, literally, not his business.

To go along with this contractual scheme, there must be a system of operating rules and property rights. In fact, the whole hospital seems to be "split down the middle" just so this three-way arrangement will work. Thus, there is a set of sanctions which permit the doctor to conduct his practice without interference from the administration or trustees. Only the doctor decides what patients shall be admitted, how long they will be hospitalized, and what inputs they shall receive.

Moreover, the doctor does not pay a user toll for the right of access to the hospital's inputs.[12] Instead, "staff privileges" are rationed by a system which is basically controlled by the medical staff. Although there is a variety of open and closed staffing policies, restricted admitting privileges, salaried faculty, professional corporations, fellowships, house officers, and so forth,[13] all of these are in effect dictated and policed by the medical staff. With few exceptions, the medical staff can dismiss or discipline one of its members.[14] It alone has rules of professional conduct, ethics, extra-hospital activities, and type of patients admitted.

Although there is a varied, complex and ever-changing system of hospital charges and cost-reporting schemes, their common feature is the separate pricing of the doctor's product and the hospital's product. Most physicians' fees are not even included in such cost reports. Those physician-originated costs which do end up in the hospital's accounts are separated into a "professional component," which is then reported separately. It is this definition of total cost (net of doctor inputs) which is the base for hospital rate regulation.

There are admittedly many other reasons why the hospital is set up this way. One could argue that the separation of an autonomous medical staff and the phenomenon of closed staffing are basically designed to perpetuate an organized medical monopoly. One could focus on the issue of the profession's self-policing of physician qual-

---

[12] Physicians may pay in nonpecuniary ways such as administrative duties or teaching. In some nonprofit hospitals, there is a significant amount of physician philanthropy. There has also been a recent increase in the number of medical office buildings incorporated into hospital facilities. These methods of "buying in" are, however, far from universal.

[13] See Roemer and Friedman (1971).

[14] As Ludlam (1970) indicates, the courts have become increasingly involved in the protection of the doctor's right to due process in these disciplinary procedures. Their basic rationale for intervention is that private hospitals, when acting upon staff membership applications, are exercising a fiduciary power for the public good. This seems to me to be further evidence that our society does not want a market-oriented "hire or fire" relationship between doctors and hospitals.

ity.[15] My interpretation here is that the doctor-hospital separation is intended to eliminate the necessity for repeated cost calculations in the clinical care of patients like Mr. X. Hence, doctors get assured access to hospital inputs by becoming "members" of the firm. Yet, unlike employees, they do not get told what to do.

The doctor and hospital are, therefore, really part of the same firm. But there is a whole system of institutional constraints designed to make doctors look like individual entrepreneurs who happen to conduct their business on the hospital's premises.[16] Certainly, there is a market between doctor and hospital-supplier in the sense that doctors can admit patients in many hospitals. And, as I have suggested, there may be some good reasons why rights of access to hospitals should be rationed by the staff privilege system rather than by the price mechanism. But, as I shall suggest below, the failure to recognize that doctors and hospitals are linked by a strong bond of joint production is at the basis of many of the hospital's inefficiencies.

4. The capacity problem

■ Except for some preliminary suggestions about the hospital's pricing behavior and methods of third-party reimbursement, I have said *nothing so far about the external market and regulatory environment* in which this firm operates. Clearly, any theory of the hospital must take these things into account. But before we construct such a theory, it must be recognized that the medical staff and administration each has its own objectives, decision variables, and constraints. Furthermore, there must be an important set of rules specifying how the two sides get along.

There are many possible ways of analyzing this problem. One might consider some kind of bargaining model in which group decision rules are derived from many utility functions. Admittedly, it is interesting to see how joint committees of trustees, doctors, and administrators decide whether to buy a new computer software package or to discontinue open heart surgery. But it seems to me that the institutional barrier between doctors and hospitals creates a more basic team problem. That is, in the absence of explicit prices, what kinds of decision rules or signals are passed between the two sides of Figure 1 to accomplish the short-run allocative task of individual patient care? What I am really asking is how the hospital manages to work at all. Why is there not a continuous mad scramble for beds, operations, and blood?

I want to tell the story here of a complicated system of rationing

---

[15] One could take the historical approach. Hospital care was not always so complicated as Section 2 suggests, nor was doctor-oriented medical care always the function of hospitals. With increasingly complex technology, the administrative role became more distinct, and the loose association of doctors and hospitals became more formalized as the medical staff.

[16] In the well-known Darling case (*Darling* v. *Charleston Community Memorial Hospital*, 33 Ill 2d 326 (1965); cert. denied, 383 U.S. 946 (1966)), the court moved toward the interpretation of joint production when it ruled that the hospital trustees as well as the physician were liable for malpractice. On the other hand, in a more recent case (*St. John's Hospital Medical Staff* v. *St. John's Regional Medical Center, Inc.*, Docket No. 11746, Supreme Court of South Dakota, Sept. 3, 1976), the court held that the medical staff was a separate legal entity with its own bylaws. See also Curran (1977).

devices, uncodified rules, and subtle maneuvering, conducted in a sanctified atmosphere of "life and death." Most of the time, this system seems to allocate resources fairly well. But as the degree of capacity utilization increases, previously stable risk-sharing arrangements break down. Doctors, fearing that they will not have access to necessary inputs, grab up their own exclusive shares to keep themselves protected. The hospital becomes a sort of noncollusive oligopoly in which each of the main actors is vying for his own separate empire.

Let me pose the problem this way. In the short run, the hospital administration must set capacity levels for each of its inputs. Although bed size is probably more rigid than the total capacity for, say, angiograms or respirators, I am concerned with the very short-run frame of reference in which all these parameters are essentially fixed. In principle, these capacity decisions should not be much different from the standard inventory problem. One has to know the joint probability distribution of demands for the firm's inputs as well as the right- and left-hand side loss functions associated with holding excess or insufficient capacity. Once the optimal magnitudes of these "defensive positions" are determined, it is then a question of doctors' figuring out which of these inputs their patients need and the administrations' making sure that each patient gets the right inputs in the right combinations at the right time.

Although this problem may seem straightforward, anyone who has been in a big, metropolitan hospital will recognize that things do not always work so well. There are queues in front of radiology. The supply of a certain type of blood is exhausted. The floor stock of chest tubes is found to be out just when Dr. A declares Mr. X's life-saving need for one. This is not just because hospital administrators failed to take courses in operations research. And it is not (as far as I can tell) because the observed level of mistakes is acceptable. In fact, there is considerable conflict within the hospital over the appropriate magnitudes of these defensive positions. It is really because the capacity problem itself is extremely complicated. And the actual solution observed is very much determined by the basic institutional split between doctor and hospital.

One complication is that the joint probability distribution of demands for hospital inputs is not exogenously given, but is under the control of doctors. If all illnesses were truly textbook cases with a known set of optimal input combinations and fixed coefficients, then the firm might do quite well estimating this probability distribution from exogenous epidemiologic data. To a certain extent, this is what hospital administrators are supposed to do. But the difficulty is that the demand for intensive care beds is as much a matter of doctors' discretionary judgments as it is a question of heart attack statistics.

As I emphasized above, hospital medical care is very unstandardized, with every case requiring the doctor's unique and individual attention. Even in those peaceful cases where nothing goes wrong, there must be a doctor standing ready to put out fires. In this decentralized regime of special attention, it is very costly to monitor what demands of doctors are really "necessary" as opposed to discretionary.[17] Furthermore, there is a strong moral sanction against interfer-

[17] It is not my purpose to pass judgment on schemes of concurrent review which attempt to monitor unnecessary utilization. The point is that special cases like Mr. X's

ing in the doctor-patient relationship. The net result is a very sanctified atmosphere in which "doctor knows best."

I cannot overemphasize the influence of this ideological tone on the allocation process. Doctors are in a position to deem all sorts of demands as necessary for their patients. This is not the same thing as saying doctors order useless tests to satisfy some ulterior motive. Additional demands for inputs above the hypothetical scientific minimum are going to be regarded by doctors as improvements in quality. And the fact is that doctors have an almost inexhaustible repertoire of things that will make their patients better off. Hence, doctors will demand some minimum very inelastically, but given the opportunity, they can slide down their demand curve with ease.

An additional complication is that the hospital administration and the members of the medical staff will attach different weights to the right- and left-hand side loss functions in this inventory problem. The administration—whether it is trying to maximize profit or break even—must consider the expected costs of holding extra capacity and the expected revenues obtained from utilizing that capacity. Although hospitals are by no means pure price takers, it is nevertheless true that if charges are based on ancillary services and patient days, then revenue will be related to the degree of utilization of capacity. Hence, it generally pays administrators to keep the hospital full. This does not mean that administrators are completely oblivious to circumstances of excess demand. No administrator wants a front-page newspaper headline about the little old lady who died after being turned away from his hospital. But the point is that the cost side of the loss function is weighted heavily. On the other hand, the institution is set up so that doctors do not have to worry about the costs of holding a certain capacity. Doctors weigh only the possible losses incurred from excess demand. Dr. A cares little about an empty bed. But he will not be very happy if he cannot get one for Mr. X.

This means that there is going to be internal conflict over the size of the hospital's short-run defensive position. And the special institutional constraints embedded in the problem make it difficult to see how this conflict is resolved. If, for example, administrators find the hospital to be underutilized and losing potential revenues, then they would want doctors to admit more patients and increase their established margins over the scientific minimum. But such an improvement in "quality" may create pressure on capacity which the medical staff would find uncomfortable. Somehow, everyone has to get his signals straight.

Before examining what actually goes on, let me suggest that an internal price system could not by itself perform the necessary job.[18] This is not merely because doctors have no incentive to pay attention to decision rules in which, say, costs per case are minimized. Rather, it would be inappropriate to require a price system to regulate the capacity of, say, a code call. Like many of the hospital's inputs, a code call must be produced and delivered on demand; it is poorly

---

are really the rule rather than the exception. Although Mr. X may have used resources in excess of some established guidelines for cases of lung cancer, it is not clear how such standards can be enforced.

[18] I do not want to get into the more general problem of why internal price systems are not used in certain organizations. The argument I make here is similar to that put forward by Weitzman (1974).

substitutable among patients; and it cannot be stockpiled as physical inventory. In these situations, both the administrator's supply curve and the doctor's demand curve will be highly inelastic. There is just no way to ration the excess demand without going below the minimum standard. Moreover, all sorts of small numbers problems of the type usually associated with failure of the price system would develop. It would be intolerable to have Dr. A and Dr. B haggle over the market clearing price of, say, one available intensive care bed which was immediately needed by both of their patients.

To be sure, there are many situations in which the transfer price for, say, an additional discretionary day in the intensive care unit would be a valuable allocative instrument. Although it is not entirely clear to me why this allocative instrument has not been tried, perhaps it is a question of making difficult distinctions with insufficient information. Even the most routine test could turn out to provide life-saving information for Mr. X. And even if it were not so crucial, Dr. A could say it was. It is not clear, therefore, where the price system would be formally applied and where exceptions would be made. In any case, it is a known fact that doctors in this country do not know the costs of blood, angiograms, or intravenous penicillin.[18]

Like many other organizations, therefore, the hospital must solve this capacity problem with a rather wide variety of nonprice-related decision rules. There are loosely enforced standards, rules of thumb, side bargains, cajoling, negotiations, special contingency plans, and in some cases literally shouting and screaming.[19] As the hospital approaches short-run full capacity utilization, these allocative devices become increasingly important. Various rules which are usually loosely enforced are suddenly invoked to curtail doctors' powers of fiat. The nurse refuses to administer certain treatments which are not in her job description. The floor secretary wants a written requisition for a procedure usually ordered by telephone. The hospital admitting office manipulates the elective waiting list. The radiology dispatcher decides who goes next. Doctors' orders, which are classified into "routine" and "stat" priorities, all become "stat." Special clearance must be obtained for angiograms and other ancillary services. Doctors hedge against the possible short supply of a particular test by ordering it far in advance. If the patient later does not need the test, it is cancelled. Doctors bargain over which patient will receive the last available intensive care unit bed. Rules for sharing operating room availability are invoked. Interns and residents become masters at the art of bed juggling.

Certainly, the kind of wild maneuvering described above does not occur in all hospitals all the time. In many small hospitals, there seems to be a tacit understanding among medical staff and administration that this allocative scramble must be avoided. Complicated patients like Mr. X are transferred to other hospitals. Only routine or "rest home" type cases are admitted. Inputs such as beds and operating rooms are pooled and available for any doctor's use. In this

[18] For a recent review, see Skipper *et al.* (1976).

[19] In an interesting case study of a psychiatric hospital, Strauss *et al.* (1963) characterized this type of allocational process as "negotiated order." In another context, see Powell's 1977 discussion of the variety of pressure tactics, complaints, and maneuvering found in the execution of Soviet economic plans. See also Ward's discussion of the interwar U.S. Navy (1967, pp. 190ff).

"quiet life" model, physicians think of their shares of this internal market as stable.

At the other extreme, these risk-sharing arrangements have broken down. Instead, each clinical service of the medical staff is constantly striving to maintain and expand the magnitude of its own defensive position. Rules are established to differentiate orthopedic beds from general surgical beds. Operating rooms are held exclusively for special uses. Each service gets its own intensive care unit. Each intensive care unit gets its own laboratory. The idea behind all of these arrangements is to ensure the exclusive availability of a set of inputs to a small group of demanders. In that way, no one is going to get bumped.

One interesting instance of this hoarding phenomenon is the practice of joint appointments. A particular medical staff physician is designated to be a "manager" of a supplying ancillary department. One frequently observes such staffing titles as "Associate Cardiologist and Clinical Director of the Cardiac Catheterization Laboratory." The same rules governing the organizational separation of cardiologists and cardiac catheterization apply. The staff physicians do not pay for the department's inputs. But now the cardiologists can control the rationing of cardiac procedures in times of tight capacity.

It could be argued that this is all just the specialization which accompanies technologically complicated medical care in bigger hospitals. But it seems to me that the causality is actually reversed. It is the constant noncooperative scramble to expand one's own defensive position which drives the hospital to bigness and betterment. I have in mind here a disequilibrium model in which everyone behaves as if the hospital is not big enough. The administration, on the one hand, wants the hospital filled. But the doctors want bigger defensive margins. The administration will expand capacity only if doctors can fill up the beds. Since there is internal conflict over the control of these defensive margins, doctors will expand utilization and increase quality to obtain their share. As a result, the administration will tolerate the creation and perpetuation of these separate empires even though it negates the advantages of risk pooling.

To a certain extent, this is not much different from the kind of quantity-quality maximizing model which has been used to explain hospital cost inflation in the post-Medicare period (see Feldstein, 1971). There is a built-in drive to expand size and complexity. When external constraints are relaxed (e.g., increased insurance coverage, increased availability of investment), then the hospital grabs up the slack. The story I have told, however, seems to have a number of other important implications.

5. Implications and future directions

■ In this section, I consider a few of the policy implications of the above discussion. Rather than providing a series of complete analyses, I merely want to be suggestive. Some of these ideas I hope to explore in future papers.

□ **Technological change.** In general, it strikes me that the right way to look at the extensive spread of increasingly expensive technology in hospitals is to ask how it affects the game which administrations and

physicians play. The above discussion suggests that pressure for new innovations is really built into the hospital's internal organization. In the same way that doctors use "quality" improvement to expand capacity, they will also use new innovations as weapons in the conflict. Instead of new diagnostic and treatment schemes which increase hospital efficiency—in the sense of permitting fewer resources per case—one would expect innovations which allow doctors to do more things for their patients. In other words, one would expect innovations which complement rather than substitute for existing capacity.

I am not saying that coronary care units, left ventricular assist devices, and bypass surgery had nothing to do with the desire to improve the survival and life style of heart patients. And there is no denying that physicians have been trained to favor sophisticated gadgetry. But in a regime of constant technical change, it is important to understand why certain innovations are selected and others are not. Certainly, these innovations have done little to decrease the intensity of resource use per case of cardiac disease. On the contrary, the current research thrust is to include a much wider class of patients as potential users of our new coronary technology.

□ **Hospital regulation.** Current regulatory policy toward the hospital sector does not give careful consideration to its effects on the internal organization of the hospital, the behavior of the medical staff and administration, and the internal allocational process itself. Without such careful examination, we are bound to produce maladaptations which run counter to our intended goals.

This is particularly obvious in the case of hospital rate regulation schemes. What the hospital actually sells to patients is the diagnosis and treatment of illness (the promise to be "fixed up"), not a collection of ancillary and support services. The product to be priced is actually the joint output of both doctors and hospital-suppliers. A pricing scheme which separates out the administration's part and the doctor's part of the product will not work as long as the doctor has control over both his own and the hospital's inputs. It has never been clear to me how a rate regulatory commission can seriously require hospital administrators to limit hospital costs attributable to say, radiology, when the doctors, not the administrators, order the X rays. Even if the administrator eliminates 25 percent of technical inefficiency in the radiology department, what keeps the doctor from raising "quality" and ordering 50 percent more X rays?

One might respond that a budget constraint on the administrator will eventually end up as a constraint on doctors' decisions. If for no other reason, these rate setting and cost control regulations, along with P.S.R.O.'s, Certificate of Need rules, and complicated accounting schemes, are all going to strengthen the hand of the administration. When this happens, doctors, seeing these constraints, will start sending the patients home earlier and ordering fewer tests. But this ignores the short-run possibilities. If doctors want to spend more than administrators have available, the hospital may be converted into the type of mad scramble I outline above. In the short run, such a constraint may lead to an increase in resources used per case as doctors grab up what they can before capacity becomes too tight. Hospitals with apparent capacity excesses or cost overruns may actu-

ally be in a deceptively stable equilibrium. Any threat to choke off defensive positions may only lead to queues and more madness.

The more rational approach, it seems to me, is to concentrate on the relation between doctor and patient and on the relation between doctor and hospital. Under the current institutional arrangement, the critical price is the physician's fee for hospital care and not the administration's reimbursement. This conclusion does not depend on the relative magnitude of the doctor part and the nondoctor part of total hospital expenditures. If the doctor makes the short-run allocative decisions, then it is the doctor's yield from those decisions that matters.[20]

□ **Organizational changes.** With all of the recent enthusiasm over prospective reimbursement, expenditure caps, and cost-reporting according to case mix, there will be nothing but the ravages of excess demand unless the cost-minimizing incentive is transferred directly to the doctor part of the organization. As long as we continue to define "hospital" as the left-hand side of Figure 1, this is going to be no easy task. One might be able to devise some very complicated internal operating and enforcement rules. But, ultimately, there must be a change in the current institutional and legal structure of doctor-hospital relations.

One possible clue to this change is a particularly interesting property of the patient care technology—namely, its tendency toward decomposability (Harris, 1975b). It turns out that the resource transfers between medical staff and ancillary departments go predominantly only in certain directions. The cardiac catheterization laboratory is used primarily by cardiologists. The operating rooms are used primarily by surgeons. Special orthopedic appliances are ordered primarily by orthopedic surgeons. Brain scans and brain angiograms are ordered primarily by neurologists. To be sure, a number of ancillary services are supplied to all demanders in the organization. Nevertheless, these partial decomposability properties suggest a method of reorganizing the hospital along separate "product lines" rather than across functions (Harris, 1975a). Cardiologists would run the cardiac catheterization unit. Neurologists would run the neuroradiology unit. Surgeons would run the operating rooms, etc. This type of system is in effect a generalization of the "separate empire" phenomenon described above, but with the important additional feature that a much simpler set of operating rules can be imposed. In particular, it may be possible to introduce cost-minimizing incentives at the clinical decision making level. But these ideas must await another paper.

References

AMERICAN HOSPITAL ASSOCIATION. *Internal Control and Internal Auditing for Hospitals*. Chicago: American Hospital Association, 1969.

ARROW, K. "Uncertainty and the Welfare Economics of Medical Care." *The American Economic Review*, Vol. 53, No. 5 (December 1963), pp. 941–973.

CLARKSON, K. W. "Some Implications of Property Rights in Hospital Management." *Journal of Law and Economics*, Vol. 15, No. 2 (October 1972), pp. 363–376.

[20] Many studies have suggested a substantial elasticity of hospital length of stay with respect to the rate of coinsurance. As far as I can tell, in all of these experiments the rates of coinsurance on both the hospital's charges and the doctor's attending fees are varying simultaneously. For a recent review, see Newhouse and Phelps (1974).

CURRAN, W. J. "Hospital Power and Medical Responsibility: Medical-Staff Bylaws." *New England Journal of Medicine,* Vol. 296, No. 5 (February 3, 1977), pp. 264–265.

DAVIS, K. "Economic Theories of Behavior in Nonprofit Private Hospitals." *Economic and Business Bulletin,* Vol. 24, No. 2 (Winter 1972), pp. 1–13.

FELDSTEIN, M. S. "Hospital Cost Inflation: A Study in Nonprofit Price Dynamics." *The American Economic Review,* Vol. 51, No. 4 (December 1971), pp. 853–872.

———. "Econometric Studies of Health Economics," in M. Intriligator and D. Kendrick, eds., *Frontiers of Quantitative Economics II,* Amsterdam: North-Holland, 1974.

GEORGOPOULOS, B., ED. *Organizational Research on Health Institutions.* Ann Arbor: University of Michigan Institute for Social Research, 1972.

HALBERSTAM, M. J. "Professionalism and Health Care," in L. Tancredi, ed., *Ethics of Medical Care.* Washington: National Academy of Sciences, Institute of Medicine, 1974.

HARRIS, J. E. "A Proposal for the Reorganization of Non-profit Hospitals." Presented at Health Economics Research Organization Meetings, December 1975a.

———. "A Linear Model of the Hospital and Its Application to the Problem of Efficient Decentralization of Production in the Firm." Presented at the Econometric Society Meetings, December 1975b.

HENRY, J. "The Formal Social Structure of a Psychiatric Hospital," in D. Apple, ed., *Sociological Studies of Health and Sickness,* New York: McGraw-Hill, 1960.

JACOBS, P. "A Survey of Economic Models of Hospitals." *Inquiry,* Vol. 11, No. 2 (June 1974), pp. 83–97.

LEE, M. L. "A Conspicuous Production Theory of Hospital Behavior." *Southern Economic Journal,* Vol. 38, No. 1 (July 1971), pp. 48–58.

LUDLAM, J. E. "Physician-Hospital Relations: The Role of Staff Privileges." *Law and Contemporary Problems,* Vol. 35, No. 4 (Autumn 1970), pp. 879–900.

MANNING, W. "Comparative Efficiency in Short-Term Hospitals." Research Memorandum No. 154. Stanford: Stanford University Center for Research in Economic Growth, 1973.

NEWHOUSE, J. P. "Toward a Theory of Nonprofit Institutions: An Economic Model of a Hospital." *The American Economic Review,* Vol. 60, No. 1 (March 1970), pp. 64–74.

——— AND PHELPS, C. E. "On Having Your Cake and Eating It Too: Econometric Problems in Estimating the Demand for Health Services." Rand Corporation Report R-1149-NC, April 1974.

PAULY, M. V. AND REDISCH, M. "The Not-for-Profit Hospital as a Physician's Cooperative." *The American Economic Review,* Vol. 63, No. 1 (March 1973), pp. 87–100.

PERROW, C. "Goals and Power Structures: A Historical Case Study," in E. Freidson, ed., *The Hospital in Modern Society,* New York: Macmillan Co., 1963.

POWELL, R. P. "Plan Execution and the Workability of Soviet Planning." *Journal of Comparative Economics,* Vol. 1, No. 1 (1977).

ROEMER, M. AND FRIEDMAN, J. *Doctors in Hospitals: Medical Staff Utilization and Hospital Performance.* Baltimore: Johns Hopkins Univ. Press, 1971.

SKIPPER, J. K., JR., SMITH, G., MULLIGAN, J. L., AND GARG, M. L. "Physicians' Knowledge of Cost: The Case of Diagnostic Tests." *Inquiry,* Vol. 13, No. 2 (June 1976), pp. 194–198.

SMITH, H. L. "Two Lines of Authority Are One Too Many." *Modern Hospital,* Vol. 84 (March 1955), pp. 59–64.

STRAUSS, A., SCHATZMAN, L., EHRLICH, D., BUCHER, R., AND SABSHIN, M. "The Hospital and Its Negotiated Order," in E. Freidson, ed., *The Hospital in Modern Society,* New York: The Macmillan Co., 1963.

WARD, B. N. *The Socialist Economy: A Study of Organizational Alternatives.* New York: Random House, 1967.

WEITZMAN, M. "Prices vs. Quantities." *Review of Economic Studies,* Vol. 41, No. 4 (October 1974), pp. 477–491.