Health Economics

Dr Pratap C Mohanty

Department of Humanities and Social Sciences,

Indian Institute of Technology Roorkee

Week – 03

Lecture 13- Hospitals as Health Provider

Welcome friends. Once again, regarding our NPTEL MOOC module on Health Economics, This is the 12-week course where various theoretical and applied aspects of health economics are dealt with. This week, we are addressing the supply-side perspective of healthcare. In the last lecture, we discussed physicians' behavior, especially physicians as health providers, and how that has led to supply-induced demand in healthcare. We also discussed their relationship with physician density, as I do with supply-induced demand with physician density, etc.

In this lecture, we will emphasize another direction of supply-side factors: hospitals and their relationship with physicians. We will be emphasizing volume output relationships. We will also try to project and explain how the competitive structure, especially it, has resulted in a differentiated oligopolistic structure and how this has impacted the relationship and, eventually, the patients or the receivers. We will also try to model the directions of this relationship in terms of their quantity versus quality aspects and/or price versus quantity competition, etc. In addition, we will emphasize hospitals, payers, not-for-profit hospitals, then hospital output, etc. So, let us begin.

Here, we are just trying to define a unit called a hospital. Is it confined to only income, or is it related to managerial interference? Hence, a definition is an economic entity an independent medical community uses to support its income, where physicians can practice their profession without managerial interference. Hence, the obvious question is whether the hospital and physician services sectors are separate and distinct or if they have connections and overlap. Both have simultaneous competition and interdependency. Hence, the concern here is the competition and interdependency and how this has resulted in the consequences. So, related to hospitals, we refer to their specialization and the kind of lucrative offers, services that have some linkages to the previous lecture on SID, and hospitals cannot grow their markets, shares, or execute any of the new alternative payment methodologies without physician participation.

The role of physicians is a must. So far, hospital structure is concerned, and hospitals provide income and security for physicians. Then, the hospital has two separate economic

entities: physician staff and administrative staff. Accordingly, the management of the hospitals, the prescriptions, drugs, etc., for the patients dealing with directions can be clearly understood. There are indeed all sorts of relationships, from physicians to supporting staff or using medical technologies, all linked to hospitals. Broadly, there are three types: hospital access, physicians' workbench, and there might be direct hospital employees and physicians, and ownership of hospitals.

All these lead to a possibility of a problem that is called the principal-agent problem, where even if all are defined to be good by virtue, there is an eventual outcome that is called the principal-agent problem because principals take some forms of decisions and some are by agents. Though agents in this context are the main CEO or the management unit, the principals are the doctors or the staff, especially the doctors. However, the principal role is bestowed largely upon the managerial bodies. So, they used to decide though the direct communication with the patient or the service receivers is lying with the doctors. So, the principal-agent problem leads to quality confirmations and some forms of information asymmetry-like troubles.

Some of these might be discussed in other chapters, but at this moment, we are trying to emphasize on the volume-output relationship where we just try to discuss the observed positive correlation between the number of procedures performed that is volume and patient outcomes. Hospitals with more patients with specific diagnoses or procedures have lower mortality rates. There are indeed two hypotheses for the volume-outcome relationship, as mentioned by Luft et al. in a 1987 paper or study. Two important hypotheses in this relationship are called learning by doing or by selective referral hypothesis and learning by doing. We know that more involvement or more the patient dealings or experiences are there then that makes the system more robust and then more learning is expected and sometimes another aspect called the volume output relationship defined is the selective referral.

Based on the experience, the referrals are made, and the selective cases are identified and that is why it is called it is hence linked to the volume output relationships. The relative importance of two varies with diagnostics and procedures. Here we have already mentioned these two, especially in selective referral hypothesis, physicians and hospitals that have better outcomes attract more patients through referrals. So, there are divisions between hospital and physicians. Traditionally both were separated by social and political powers, but physicians avoided being captured by the hospitals to maintain both professional autonomy and control over their incomes.

Hospitals were initially intended to function as a doctor, workshop or a physician cooperative. So, even this is what largely identified through the problem of principal agent where these conflicts arises. And physician centric model to hospital centric model is important to discuss as well. In the physician centric model, it is highly the physicians who are important and basically interdependent physician run their clinic. Sorry, the

independent physicians run clinics and consult at 2 to 4 hospitals. Patients seek out doctors as per their availability.

That is purely a physician-led model. Since physicians are the important drivers for the supply and may be due to their reputation or their independent working module, they can set up their own. The second one is hospital-centric. Based on the hospital, physicians are determined or demanded. In this case, hospital one, where the large involvement of the private sector role is important, where the market-based competition is driving the centric model, this hospital centric model.

This also focuses on returns, and another direction of this is awareness or global practices. However, these two are indeed merged to a large extent, the special physician and centric model is tended to a hospital-centric model. The merger of these two powers is important. Hospital centric model favors the full-time physician model in which a physician gives his services to one hospital or hospital full-time rather than working for 2 to 3 hospitals. So, there are pros and cons to both.

There are pros for patients, for physicians, for sure it is for the hospitals. Like for patients better pre and post-care advantages are derived, better forecasts of cost, available to doctors in one hospital at all time, especially for physicians, the advantages are like reduced administrative burden, better work-life balance, job and income security, opportunities in academic medical research and reduced overhead cost of operation because overhead cost of operations are taken care of by hospitals because of their merging approach. As the other two categories will be supporting hand, especially in this case, this helps focus on academics and research, the standard medical practice will improve, and a culture of patient centricity is going to be built with more focus on specialized departments. This will generate consistent clinical outcomes. There are some cons to this full-time physician model in a hospital setup. Especially the work culture might be restrictive for some because you are supposed to go by the regulations of the full time model and it has less autonomy and input and opinions may not be valued enough.

So, there are relationships between hospitals and other hospitals to derive the demand for better healthcare supply. This lies with competition and the competition in healthcare especially is dissimilar from other industries because it is not just typical competition. The competition varies because access to healthcare is a basic right in many countries, and hospitals are forbidden from denying anyone care. High barriers to entry, like building and staffing a new hospital, require high initial investment costs and high standards of regulations set by the respective government. Another important direction as a relationship between hospitals and other hospitals is that the presence of insurance distorts the typical economics of supply and demand.

We will discuss all sorts of things one by one. As I already addressed from the beginning of this lecture is about the formation of market called differentiated product oligopoly. For the

given special characteristics of the hospital market, only a few hospitals compete within a geographic area that leads to a possibility of oligopoly market. Hospital market is differentiated product oligopoly. Hospitals are not perfectly substitutes, and facilities may differ in two hospitals even if they have the same facilities.

The staff and staff experience differ; patients are loyal to their physicians or surgeon, although distance to hospitals matters. A differentiated product oligopoly is all about defined as a model of competition in which there are few firms as a result of barriers that restrict entry and in which the products supplied by the firms are not perfect substitutes for each other. So, to understand this differentiated oligopoly you might have read in microeconomics. To emphasize a few, this is the key, the products are not of perfect substitute size, there are differentiation and because of restriction heavy barriers to entry restrictions, very few firms are operating. Hence, the differentiated product oligopoly is expected in this healthcare market.

Similarly, in hospital markets leads to concentrated market power, possibilities of collusion and high prices and low output and that can be measured through the standard approaches called HHI or Herfindahl-Hirshman index and that is largely an index which is defined as sum of squares of the market share of all the hospitals in that particular market. So, in short it is called HHI and defined as sum of squares of the market shares and SI is called market share and if the HHI index is 1 that means one hospital controls all market that means the market hospital share is captured by 1 and if it is 0 that means it prevails with perfect competition. If the figures are close to 0, that means near-perfect competition is defined, and good competition is expected. If it is close to 1, then it is more monopolized, or the oligopoly structure is defined. One such example mentioned by Gaynor and Town in 2013 for the US market in 2006, they found HHI in hospital markets is approximately 0.33

This indicates the presence of concentrated market power but less competition in hospital markets. So, still, it is very less. The competition is there, and it indicates some market concentration, but still, there is very little. There are some other approaches of estimation you can do it to assess the competition. Usually, the concentration ratio is measured, and that is in a standard format called CR4 industries concentration, and we follow HHI in some of the papers we have referred to Mehta et al., 2016; Samadzad and Hasemi, 2021.

You can also follow some data sets called Pharma Trac and CMIE Prowess to understand the concentration and how it works for your research. We are just putting two examples for you to calculate and understand the market power or the concentration. The first one is suppose there are ten firms in a market, and each has an equal share of Si, equal to 10 percent or one upon 10.

So, it is one upon 10. For each firm, you have equal share here. What is the value of the HHI index in this market, and how we can interpret it? As I already told you, the market share has to be calculated as the sum of Si square. You can just put it like you say Si is equal to 1

upon 10 for 1. So, S_i^2 for the first one, S_i^2 for the or 1 plus S_i^2 for second firm plus S_i^2 fro third firm and so on till tenth firm.

So, these all will be $\left(\frac{1}{10}\right)^2$ plus $\left(\frac{1}{10}\right)^2$ ten times. Isn't it? So, this is one upon 100, so plus one upon 100 and 10 times it. So, ten by 100 is equal to 1 upon 10. So, the concentration value is one upon 10. So, this means only in terms of decimal, it is 0.1.

The market concentration value is 0.1. How do you interpret this? It is very close to 0, the HHI level we have already said. If it is near about 0, the extent of competition is higher. The competition level is higher. If it is close to 1, there will be more concentration, and maybe some firms will control a larger share. This is what you can calculate for the first question.

This is for question number 1. For Q2, you can solve it, I will just give you a hint. For Q2, the question is slightly different: some firms dominate the market. Suppose instead of the first example of one firm, we have just mentioned that one firm dominates 90 percent of the market share in this market. The remaining nine firms control or have an equal share. So, one is 90 percent, and the others are the same, meaning the other 10 percent share is divided by the other nine firms.

So, 90 percent and square plus the other 10 percent divided by all nine and their square, you are supposed to just add it, and you will find the value. So, in this case, it seems very clear that you will find a value that is close to 1. I am just giving you a hint: you can just calculate instead of 1 and 1 upon ten every time and square it will be nine by 10 for the first and others are very less and you will get a value very close to 1. So, if that is the case, the market concentration is very high and this seems few players control the market. So, after deciding on market capture or concentration, we have another direction called the trade-off between price and quantity competition.

Price competition means whether price competition should follow or coin competition should follow, that depends on the kind of structure the healthcare country is having. Usually, as I already said there are strong market barriers for entry in most of the country in the world. We start with the basic example of UK versus USA. One is mostly government- or public-controlled; the other is privately facilitated or privately or market-oriented, the US one. Given this backdrop, whether this leads to more of price competition or more of quantity competition, just the single answer for it is that where if it is largely regulated and or the facilities is largely provided by insurance, where moral hazard problem really works, role of price really does not matter.

So, there is no price competition because it is mostly regulated and price is eventually near the same. So, price competition is possible when co-payments are made. We already discussed co-payments in our earlier lectures or in different weeks, especially in the insurance market. And now it lies with another direction called quantity competition.

Hospitals compete on quality by adopting the best medical technologies available to appeal to physicians and their patients.

This has largely resulted in the hospitals accumulating the best medical technologies to influence demand. This also leads to some overconsumption of medical technologies as well because of the competition that has driven further accumulation of different forms of quantity or to differentiate their quality. There is a race, and that race is called the medical arms race hypothesis, as mentioned by Dranove and Satterthwaite in 2000. If supply-induced demand is present, a medical arms race may harm patients by increasing their medical consumption and health expenditure. Because in the race to accumulate more technologies that will unnecessarily drive the demanders through the supply, it will eventually result in higher medical consumption and expenditure.

And that is one important direction for further research. Positive competition has higher cost correlation. So, you can just see and try to prove in your own work. In terms of hospital competition and patient outcomes, to some extent, we discussed ambiguities. In the standard practice, more competition leads to improved welfare.

However, in hospital market the literature suggests ambiguity in result because some suggest worse morality rates in more competitive environment and some also suggest competition improves welfare for patients. And ambiguities have motivated government in some countries to regulate the hospital industry by rationalizing hospital industry and eliminating private competition. So, some other relationships are important like hospitals and the payers related to hospital bill and cost shifting etc. In terms of uncompensated care, hospital costs that are not covered by out of pocket payments, public insurance or even private insurance, in that case the relationship really matters, then it is questioned as who pays for uncompensated care, indeed nobody. Government may provide subsidy or relaxed access for compensating their cost.

Cost shifting sometimes occurs due to the cross-subsidization. We already discussed the richer one might compensate the exact word is called cost shifting. And hospital may also charge more from lucrative services, may also subsidize in other cases. In nationalized system, cost shifting occurs at tax collection level as well as through progressive tax structure. Nonprofit and hospital production, equity is a concern and everyone should have access to basic healthcare.

Could the question is here is that why do the nonprofit hospital exist? Private hospitals divided into for-profit hospitals and the private hospital is largely divided into maybe for profit hospitals and maybe for not for profit hospitals. So, cumulative cost of care at not for profit hospital is lesser. For profit hospital accounts for 55.3 percent in patients while not for profit hospital account for only 2.7 percent in patient care in Indian structure as identified by Serwal 2021 study.

Hence, there are four aspects largely discussed. One is called government failure theory, and the other is called the altruistic motive theory. Then, there is asymmetric information and failure of trust theory and nonprofit as for profit in disguise. The government failure theory is where nonprofits exist to satisfy the demand for charity care above and beyond what the government provides. Altruistic motive theory where some entrepreneurs have altruistic preferences such as maximizing output, not profit and organize nonprofits to achieve them and asymmetric information might create distrust and nonprofit exists because donors cannot observe how for profit will use their donations and do not trust them. And the last one nonprofit is profit in disguise where nonprofits are profit-maximizing firms taking advantage of the legal benefits, especially for nonprofit status such as taxi evasion etc. And here in Indian case not-for-profit hospitals, sometimes the premises are different in different setups in faith-based hospitals, community-based hospitals, cooperative hospitals, private trust hospitals.

Basically, the classification in Indian context is largely on four aspects which I just said, these four indicators. You can see the differences. And if you see faith-based selfless service to the society as service to God, whereas in community-based selfless service to the on privilege of the society is the point. In cooperative case, self-sufficiency in healthcare, whereas in private trust, the service rendered on a no-profit and no-loss basis. So far as founder perspective is concerned, there are also differences, which you can see from their work by Serwal et al.

And last couple of things to explain here related to challenges specified not for profit hospitals in terms of recruitment, in terms of reimbursement, funding and compliance pattern, you please go through these aspects. I am sure you will find the difference very clearly. And coming to hospital output, it is really difficult to measure and input the output of hospital services because health is multidimensional and consists of subjective component. You cannot measure change in health before and after hospital services.

You can also measure survival and complication rates. There are other important points as well, you can just see. Another aspect called option demand where customers of hospitals are not just patient treated, but the whole population of this case material. And hence hospital output matters. Hospitals keep beds on reserve for emergency needs, maybe there is a possibility of option demand. Hence, the H0 that maintains to H1 is basically decided as health states without hospitalization.

And then that might be health state after hospitalization we are just using H1H. Two measure of output of hospital services will be one small h2 H1. So, that is basically some the measure of hospital output. And output indicators of hospital activity you can just follow from like quantities of factors of production, from point of individual medical nursing services performed, number of patients of cases treated and number of percentage etc. And here we are trying to give the direction in terms of some issues such as percentage and cases treated as intermediate hospital products.

So, starting with factors of productions, in our efficiency analysis unit, you will find the difference between these, the overall technical efficiency starting from a primary input to an output where we discuss as various forms of primary inputs. The idea is to go for minimizing cost or maximizing output, which is largely called technical efficiency. And it has the scope for understanding of managerial efficiency and scale efficiency. And we will also discuss that in our efficiency unit. So, largely we start with the output as medical services or sometimes those also calculate use as secondary input.

The final forms of output are their percentage and cases treated. And in the percentage we say nursing efficiency and cases treated, we say internal medical efficiency, though there are also other external medical efficiency issues as well. So, far as percentage is concerned, it reflects the nursing component of the hospital services, whereas cases treated we refer to as the medical component of the hospital services. So, this point also clarifies how different inputs may be assigned to two components of intermediate products. So, this is what we just started explaining: nursing efficiency and internal medical efficiency.

So, in internal medical efficiency, we all discuss this as use of least amount of medical services possible per case. So, to optimize the service. So, here it is not just the output that is percentage or cases independently. These two are also interlinked to define the best use and we can derive the efficiency out of it, especially the day spent in hospital may themselves to be considered as an input into treatment process. And this will also minimize the length of stay and least use and other forms of efficiency called as length of stay efficiency.

And one of the understanding is important to mention: if two hospitals treated equal number of cases in a year, is it appropriate to say two hospitals achieved equal? It is indeed no because there occurs heterogeneity of output that services, hence they are not comparable. So, in that case, the service categories are really different. So, sometimes we say beds held on reserve and even the concept which we already started discussing called option demand, we reserve some of the beds for emergency care. Part of the hospital's factor endowment which is allocated to service capacity held on reserve, make number of beds or number of beds as another indicator of hospital output, how it is available for the patients on emergency or at the time of dealing with some other securities. There are heterogeneity as I already said in terms of output even if the output or number of cases dealt are same, but the quality of or the type of service has different.

Treated cases differ along the following dimensions, depending on type of illness, severity of illness or complications, stage of the disease, concomitant disease, patient characteristics, etc. We usually refer to three most common patient classification systems: ICD standard, international classification of disease and diagnosis related groups, DRG groups and patient management categories, PMCs. So, I think I have already explained. Now I am emphasizing some of the standard referral databases and standardized categories

related to disease classification, we refer to ICD.

WHO maintains this. This provides critical knowledge on the extent, causes, and consequences of human disease and death worldwide. Latest version is called ICD-11 was adopted by the 72nd World Health Assembly in 2019 and came into effect on January 1st, 2022. This allows comparison of mortality and morbidity data across countries or regions at different times. Diagnosis related groups we refer to DRG and patient one we refer to PMC, patient management categories. DRG system is used by medical care and other insurance providers to categorize and pay for hospital inpatient services.

This group groups patients with similar clinical conditions and treatment needs and was introduced in 1982. So, we can compare DRG versus ICD in terms of billing and reimbursement and as well as ICD is for medical documentation and statistical analysis. There are some overlap as well between these two.

Last one is called the PMC. This is compared to DRG. PMC put greater emphasis on concomitant diseases and the treatment strategies by the hospital, which is complementary to the DRGs. Then some other couple of things to mention at the end of this lecture comparing hospital efficiency. This lies on barriers of entry, cross-subsidization or government subsidies and regulatory agencies as well. Hospital efficiency can then be calculated by comparing it with other hospitals through the parametric method and non-parametric method.

Largely, we use DEA. We are also explaining in our respective chapter on DEA and also will give you some direction related to some conversion of the non-parametric component to parametric component, especially controlling the errors and where hospital cost functions through the SFA, stochastic frontier analysis will be just stopped in our module. And measurement of hospital efficiency requires input and output. So, we will be also explaining in detail. So, we are explaining this in unit number 10. So, these are all related to hospital as the service provider for healthcare and the appropriate readings were mentioned.

The next lecture will discuss various ways of paying these healthcare providers. So, the next lecture will emphasize the payment structure, etc. So, with this, I will stop here. I hope you will understand and you will raise questions. Thank you.