

Healthcare Economics

Sol Yates

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Lecture 3: Topics in the supply, regulation and financing of health care

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Resource Allocation

Supply, regulation and financing of health care

We need systems to pay healthcare providers, but there are multiple way's of doing this, for healthcare to try to improve the healthcare provided to patients.

How do we pay hospitals? Lecture 1

Can we use incentives for the care a doctor may provide - lecture 2

How is healthcare different?

- most health care is not paid for directly by the consumer
- instead, providers are reimbursed by a third party payer (or purchaser), which is government, private insurance companies or social insurance funds depending on country
- The supply of and market *for* healthcare is therefore highly regulated

As such, price competition is typically absent, and instead provider compete for patients in non price dimensions - quality, waiting times, complementary services (visiting times)

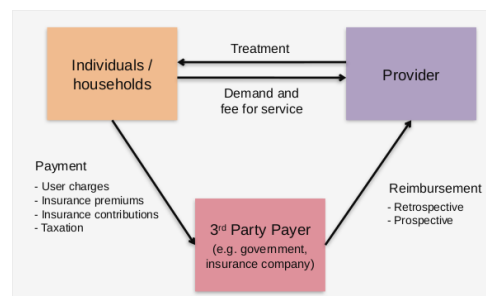


Figure 1: Simplified healthcare financing relationships

Healthcare is a fundamentally different from other types of good

- demand for healthcare is uncertain - the onset of ill health is difficult to predict, whilst healthcare is often a need and not a want
- Healthcare is an experience good, the quality of the good cannot be known until after consumption. Thus questioning the link between quality of care and demand
- there is a moral understanding that access to health care should be universal

Furthermore, there is *information asymmetry* (Arrow, 1963)

- between patient and provider - the patient is uncertain about the outcome of 'consuming health care'
- between payer and provider - the quality of care is often not verifiable to the payer (without expensive monitoring)

0.1 the role of reimbursement in health care

Financial incentives are common in most industries, payers can use reimbursement system to incentive provider behaviour, providing that health care providers are concerned with profits.

There are still financial incentives we need to think about

Challenges in health care reimbursement

there is a tradeoff between cost, access and quality
where other challenges are specific to health care

1. upcoming - relating to information asymmetry - want to measure activities hospital are doing as accurately as possible, but the doctors are the ones recording this. So the payer is relying on honesty here, but there are cases where hospital have overstated this to get more funding
2. supply induced demand - idea being that with information asymmetry, but between patient and provider, provider can over treat patient. Dentists get payer a lot based upon how many treatments they can provide, say a filling when not necessary → unintended incentives we may face.
3. cream-skimming and dumping patients - more profitable patients you keep, least profitable you get rid of

Role of health economics

One side of health economics is modelling to try to explain what will happen under certain assumptions, on the flip side there is the applied side, was switching from one thing to another the best thing in reality. Theoretical models have their limitations, assumptions may be too strict, and for applied it needs repercussions. Strike a fine line

Context in the UK How to pay hospitals whilst maintaining efficient and quality of care, think of picture.

0.2 Types of reimbursement systems

Characteristics of reimbursement systems Fixed vs Variable

- fixed - reimbursement does not change as activity increases or decreases
- variable - reimbursement increases as activity increases (dentist). Where some systems can be more variable than others, but it depends on the level at which activity is reimbursed (per item or period)

Retrospective vs Prospective

- retrospective - payer reimburses all costs for treating patient
- prospective - agree price before hand, any extras hospital provides is not included in the reimbursement
- close ended - set budget, that is max revenue
- open ended - no limit on how much hospital can spend

Prospective systems can have variable and fixed aspects, but if retrospective then .

Cost based reimbursement

$$R^c = \sum_{i=1}^N [Q_i \cdot c_i] + Z^c$$

This is a relatively easy system to implement, Z is non-activity related revenue say maintenance costs. Unit cost c either set by payer or determined by natural price in market

Features Retrospective, variable, open ended. Varies depending on activity provided

Pros

- Clear incentives to provider to increase activity - good for access
- if c_i includes some profit, for every case treated get some profit on top of that, this creates further incentives
- incentives to improve quality
- common in US 60s/70s → but led to medical 'arms race' - competing to provide the best health care

Better quality, but costs could spiral

Cons

- Little incentives to reduce costs
- no control over global expenditure
- adverse incentives = supplier induced demand

Global budgets

lump sum amount of money, upto hospital if overspend

$$R^g = \sum_{s=1}^S B_s + Z^G = \sum_{s=1}^S [\bar{Q}_s \cdot p_s] + Z^G$$

Features Prospective, fixed, close-ended

Pros

- Incentives for provider to reduce costs and improve allocative efficiency
- payer has control over global expenditure (closed ended)

Cons

- potential adverse impact on quality
- weak incentives to increase activity
- providers may exceed target volume of activity
- adverse incentives - 'cream skimming' - selecting which patients to treat and services to offer

This was the main way of reimbursing for a while, then moved to cost based reimbursement systems after the medical arms race

Prospective Payment Systems

costs spiralling in US in 80s, but also wanted to increase activity, reduce waiting times. IN England, 'activity based financing' - per unit of care (item to period), tends to be per case now.

For every case treated, get this price. Grouping similar patients together based on diagnosis related groups (DRGs), and then set price pay hospital in say DRG1 equal to the historic how much it costs to treat that group of patients across the country

So take average costs and reimburse all hospitals this. DRG called HRH in England since the population and conditions faced very between England and America.

Normal delivery without CC - complications or co morbidities = £1496, but this may be unfair if paid all delivers one price, patient with CC would have less funding.

$$\text{Linear: } R^A = \sum_{j=1}^J [Q_j \cdot \hat{p}_j] \quad \text{Mixed: } R^A = \sum_{j=1}^J [Q_j \cdot \hat{p}_j] + \dots \quad (1)$$

Marginal, mixed - weighting

can set $\alpha = 0$ so that it becomes closed system

0.3 Theory of yardstick competition

Model setup Payer (principal)

- an all knowing payer could directly contract incentives for cost reduction
- however, payers are often unable to monitor and contract cost reductions
- the payer has 2 instruments : price and a lump sum transfer

Provider (agent)

- providers are profit maximising
- providers have degree of monopoly power = downward-sloping demand curve
- each provider faces a constant marginal cost
- possible to reduce marginal cost through a costly fixed cost reduction effort

But how to incentivise cost reduction and increase activity?

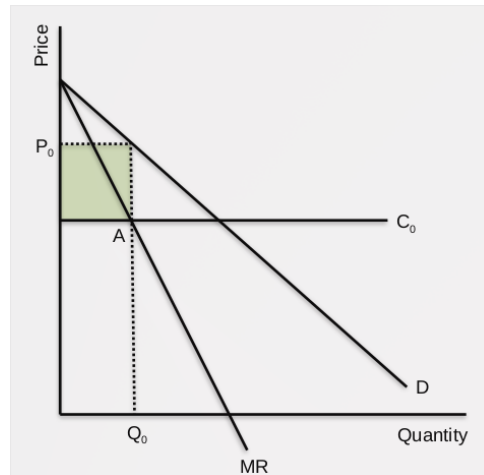


Figure 2: Retrospective Payment

Under PPS

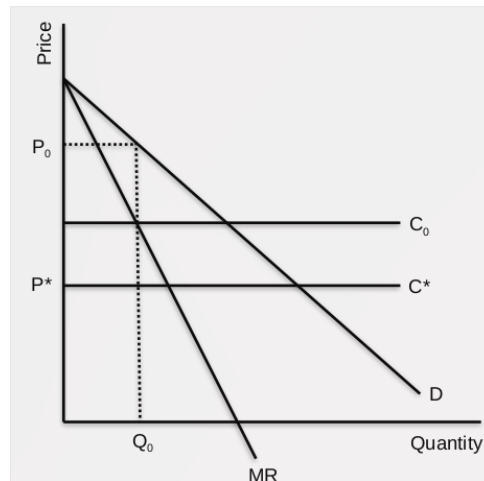


Figure 3

Scenario 1

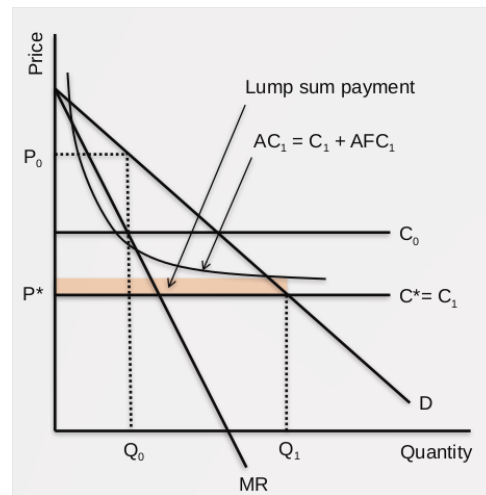


Figure 4

Produce at q_1 but make loss of orange area since AC is higher than AR, but Schliefer : to incentivise reduction of MC, we can pay lump sum 'break even' payment. Make 0 profit but produce at Q_1

Reduced marginal cost to that of everybody else, if we keep investing in technology

Scenario 2

We can move marginal cost to C_2 , they invest more to move marginal cost down.

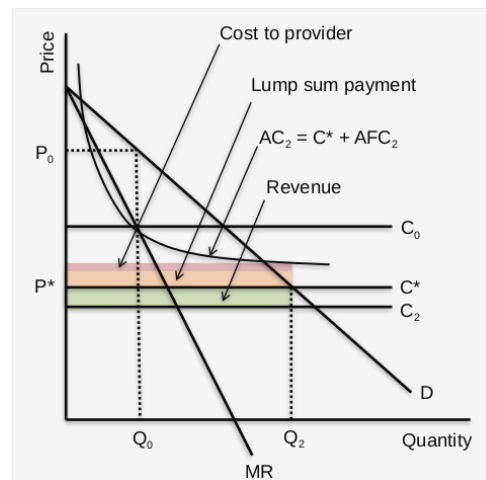


Figure 5

Trading off the size of the rectangles

Would the payer stop making profit, if didn't pay orange then hospital making loss of red plus orange, then overall loss since red and orange greater than green. But key is that since setting price equal to marginal cost of all firms in market, the BE payment 'differs' based upon hospitals starting point, if producing at c^* already, get no BE sum, intuitively.

Even with break even payment, still incentivised to reduce costs.

Optimal solution involves lump sum transfer, but if this becomes tricky to do (in paper), we can set price based upon some sort of average cost pricing - making p^* higher because we also compensate for lump sum transfer in price that set

That is average cost of treating DRG group in the past,

Extensions If lump sum transfer not possible Or, heterogeneous firms Or, in London or not (in the model)

Pros

- Stronger incentives to reduce costs and improve efficiency
- incentives to increase activity (depending on how we define this)

Cons

- Potential adverse impact on quality (or activity) say intensity (quality) of services - may negatively impact, if not paid to keep patient. may release prenatally if not keeping in after couple days
- open-ended - limited control over global spending
- Unintended consequences - information asymmetry - hospital is one to decide whether CC

Payer is reliant on physician's judgement, this could have a knock-on effect for those not upcoding (since others have cheated the system). Patient reported CC vs hospital reported CC, comparing over time since noisy - patient reported remained flat whilst hospital reported increased over time, is there some reason for this? But really can argue due to upcoding, or that in the past patients with CC were undercoded

One hospital may be more efficient, prioritising different CC. But remember triangle between cost, access and quality

trade-offs between reimbursement systems All have advs and disadvs, there is so much variations since different systems require different things at different points in time

Differences between countries

There has been movement away from historical budget (global). Looking at DRG (prospective) based system, the amount of money reimbursed varies massively, comparing Austria ~ 90% with Estonia 39%.

Additional payments provide incentives

At the top we have DRG system developed in America, in England we have healthcare resource groups, highlighting PPS are different across systems.

It is common and often case that PPS aren't fully prospective, we see variations in what we see in hospitals depending on primary diagnosis, secondary diagnosis, CC, treatment intensity and lengths of stay and decisions hospitals make, that can influence revenue.

Essentially, there is a prospective component and a cost reimbursement component, finding they are much less prospective than is assumed.

Reimbursement systems in England

2003 - Payment by results tariff system first introduced

- prospective payment system to reimburse hospital care
- system in which autonomous providers competed to deliver care

2020 - COVID-19 led to the suspension of PbR system entirely

- the NHS reconfigured services to deal with the pandemic
- faced significant new costs that were hard to precisely anticipate

Now, there is a movement towards blended system (fixed, variable and quality payments)

- NHS is increasingly emphasises collaboration over competition
- there is a mismatch between policy intentions and payment incentives

0.4 Evidence on reimbursement systems

limitations of previous theoretical model Theory of yardstick competition is useful to illustrate rational behind PPS, but it doesn't consider quality of care, just quantity and costs. Assumed profit maximising

Ellis & McGuire (1986)

- developed a theoretical model to derive optimal reimbursement system
- when physicians also care about the benefit to the patient (benevolent)
- using a cost-sharing perspective

Model setup

- Single Patient (principal) - Assume patient is fully insured (no out of pocket costs), they will accept the level of treatment prescribed.
- Essentially that there is optimal level of benefit for the patient q^* Hospital (principal) - Hospital profit maximise (think of manager, profitable, don't shut down (profit function of revenue and cost))
- Physician (agent) - decision maker - decided quantity of services, derive utility from hospital profit. Compensation is independent from treatment costs

Physician indifference curves - an inverse flip of patient benefit curve, as provide more quantity, provide more treatments but profits drop. There exists best possible care at q^*

The shape of ID curve is $MRS =$ rate at which physician willing to trade 1\$ of hospital profit for 1\$ of patient benefit. We assume MRS is constant, that ID curves are parallel.

2 types of Physicians

Perfect agency
Imperfect agency

Findings Investigates optimal solution under reimbursement systems

Scenario 1 : under pure cost based reimbursement

- hospital revenue = cost, profits always 0
- quantity of services therefore does not affect hospital profits
- Implications for physicians behaviour

Scenario 2 : under imperfect cost-based reimbursement

- not always the case that revenue = cost
 - providers have some degree of monopoly power to influence price
 - payer has imperfect information about true cost of services
 - payer builds in profit margins into payments

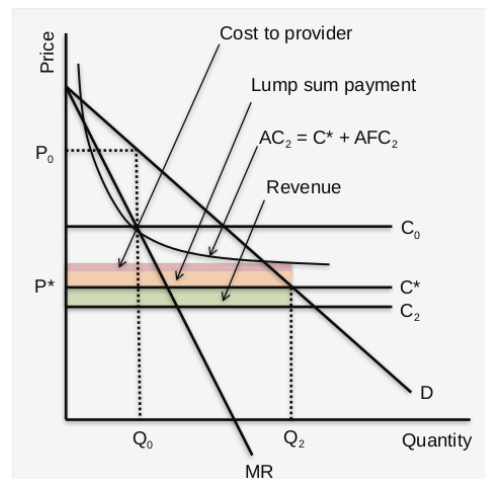


Figure 6

- profits greater than 0
- slope of profit line is equal to difference between marginal revenue and marginal cost
- physician chooses quantity of services q_2 to maximise utility

scenario 3 : Under PPS (perfect agency)

- set $q = 0$, profit = expected payment (single patient)

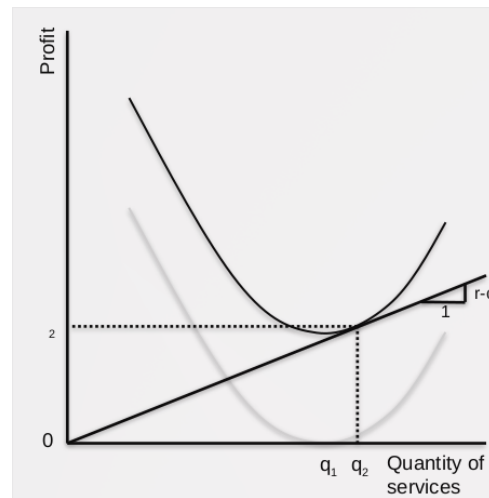


Figure 7

Quantity of services q_1 pure cost based system, we see a drop in quantity of services from here and an increase in profit, optimal solution is worse

Prospective payment price P is based on historical, across everyone in market. Over time price is calibrated and lowered to reflect lower costs hospitals now providing. Profit line intersects IC. But notably because indifference curves are vertically parallel q_3 stays the same

scenario 4 : (imperfect agent) indifference curve is a lot shallower, relative to perfect agent curve p_3 , provide lower quantity, intensity of services q_4 . But in doing so, benefit of q_4 is worse than benefit q_3 Essentially,

Mixed payment system still fixed prospective payment for treating payment but also cost-based payment that is fraction of cost, reimburse some of cost. Fixed prospective

Set prospective payment

Physician has lower utility, but at q_5

Even if doctors do care bit more about profit, can still devise system where they produce as if they equally valued patient benefit and profits.

This has some real world values, looking at Spain only 20% of hospital fee reimbursed but also have FFS. May be more private hospitals for example, reducing the amount of prospective payments

In summary, **Ellis & McGuire (1986)** formalise how different payment systems can yield different results.

Models give idea of what may to expect in real life - but are these assumptions realistic?

Ellis and McGuire better in this respect, incorporating patient benefit, but still need to look at empirical evidence - evaluating adoption of other health care systems.

4 hour A&E target - target setting, can we translate this into salary?

is this a command N?