Waiting List Reduction and Strategic Options in Spanish Hospitals

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Abstract

In public health care systems, the existence of waiting lists has become an important issue with a determinant influence on the quality of services provided. For this reason, the control of waiting lists is taken on as a primordial target to be met by public sector management.

However, when managers and politicians speak about the control of waiting lists, the strategic options to be taken and their corresponding costs are not always clearly defined. In an attempt to clarify the discussion, this work analyses the real situation of waiting lists, classified by different services, and their potential reduction if full capacity utilization were reached. To do this we quantify the distance separating the observed and the maximal capacity levels in Spanish general hospitals operating in the public sector with more than 200 beds.

We use non-parametric frontier methods and, after applying the specific process proposed, the potential reduction in waiting lists is calculated. The following factors are taken into account: a) reduction of technical inefficiencies found, b) control of the average number of in-patient days c) the increase in the variable inputs needed to guarantee maximal use of the existent fixed capacity, and d) the potential reduction in waiting lists if the capacity of each hospital were improved. As a logical extension, the impact on the total costs of each of these options is estimated.

The results show 1) the problematic situation in surgery and trauma services, 2) the limited potential reduction of waiting lists if only inefficiencies were controlled, 3) the important effect of a combination of policies to control the average number of stays and, at the same time, to increase capacity utilization, and 4) that the effective contention of waiting lists in surgery and trauma services requires an increase in existent capacity.

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1. Introduction

Public services users are concerned about the deterioration in the quality of traditional institution-based services. A primary example is the growing concern about reduced access to care, most often expressed in the form of increased numbers of patients, or unacceptable lengths of time, on waiting lists. Waiting lists are common to all public health systems. They lead to a lack of confidence in and prejudices against public systems and are the first cause of dissatisfaction with public assistance. In Spain, and in other countries with universal public access, thousands of non-acute patients are compelled to wait to be diagnosed or to receive specialized treatment. In real terms, during this period, these patients' rights to protection against illness are effectively suspended.

Nevertheless, waiting lists arise from the application of principles of social justice. They appear as an undesirable secondary effect promoted by economic equity mechanisms. The process is well known: the demand for medical treatment at zero price tends to be infinite whereas the supply is irremediably finite; as a consequence waiting lists appear.

However, the problem with waiting lists and waiting time has other dimensions: a) the capitation payment to primary care doctors indicates the distribution between specialists and hospitals, b) the inadequate distribution of current students can operate as a bottleneck in the future c) the incorporation of new technologies can induce new demand or d) the inadequate process for the replacement of obsolete equipment can reduce productivity.

Naturally, there are no waiting lists in health systems based on market prices, but patients cannot access the medical care they need. Neither are there waiting lists in some public services where, without questioning the equity, payment for each treatment acts as concealed market prices.

When efforts are made to quantify the extent of waiting lists, a new problem arises of what exactly a waiting list is. As pointed out by McDonald et al. (1998), commonly 20-30% of those on waiting lists are found in the international literature to be inappropriately placed**,** because they have already received the procedure, have died, never knew they were on a list, were placed on the list in the first place for reasons unrelated to medical necessity, or were no longer awaiting the procedure for some other reason.

Moreover, all the proposals for the elimination of waiting lists, especially those related to technological intensive care, would require an excess of capacity to be operative in peak periods. However, experience demonstrates that the excess of capacity will always be temporary due to the fact that, at zero cost, the supply always generates demand and the waiting lists quickly reappear.

We also know that the strategy to control waiting lists can give rise to perverse incentives that, paradoxically, increase and encourage them. A hospital contracted by the national health system and paid according to the number of 'in-patient days spent in bed' is sure to have more waiting lists than if the same hospital were paid according to the number of patients treated. When funds are allocated to control waiting lists, the length of the queue is usually a decision variable: the longer the lists, the more money the hospital receives. In other cases, for reasons of prestige, attempts are made to extend waiting lists or to simplify the operational activity (the guaranteed demand allows the supply to be adjusted). There are other incentives for reducing system productivity: (a) doctors can increase their private activity outside the public sector by increasing the waiting time in the public sector.

Waiting lists can also be seen from another point of view. As stated in McDonald et al. (1998) they indicate the absence of costly excess capacity. Other benefits may include allowing time for patients to reach more considered decisions about interventions, particularly if they entail some risk, and permitting more conservative treatment choices. British studies of orthopaedic and urology waiting lists, for example, suggest that when lists are audited, between 17% and 31% of patients no longer want the prescribed surgery.

In order to deal with the problems arising from the existence of waiting lists, there are three general types of policies: a) monitoring policies, supported by careful and comprehensive data collection; (b) "supply-side" policies which focus on the delivery of services; and (c) "demand-side" policies which focus on the management of waiting lists. Here we concentrate on the “supply-side” policies by analysing the effectiveness of the different actions that can be taken to reduce waiting lists and waiting time. There are two reasons for this choice: a) our data base only includes data on hospital activity, and b) the methodology we apply is grounded in production theory and focuses on efficient frontier analysis.

We are specifically going to study the effectiveness of the following measures on waiting list reduction: 1) the increase in hospital output via the elimination of inefficiency 2) the reduction in in-patient length of stay and 3) the maximal utilization of current hospital capacity. In the remainder of this paper, Section 2 provides a description of the evaluation methodology and the strategic options related to capacity utilisation. Section 3 presents the data and the variables chosen. Finally, Section 4 comments on the results obtained by applying the proposed model to the sample of Spanish hospitals.

2. Definition of strategies and formalisation of methodology to estimate the potential reduction of waiting lists

The strategies we analyse are initially classified into two subsets: 1) those that can be applied without needing more resources and 2) those that need more resources in order to be implemented.

2.1. Radial output expansion controlling technical inefficiency

This strategy is based on the changes required to hospital organisation in order to obtain more output without requiring more inputs (at least explicitly). When managers speak about the need to apply processes reengineering, to decentralize the organisation, to introduce a culture of accountability and responsibility through the establishment of cost and profit centres, to reinforce the management for results, to focus on the generation of value, to generate knowledge and intellectual capital … in fact the underlying idea is to drive the organisation towards reaching its highest potential output. In other words, hospitals operating in national health systems are very complex organisations and, as is well known, the absence of internal competition gives rise to the presence of X-inefficiency. Obviously, the reduction of this technical inefficiency can signify the improvement in the number of the patients treated.

To estimate potential improvement through the control of technical inefficiency, we use non-parametric methods. Description of the methodology requires the production technology to be presented. Production technology is defined as the production possibility set containing all feasible input/output vectors: *S = {(x,y) ½ x can produce y}*. The input set associated with this technology denotes all input vectors *x* capable of producing a given output vector *y*: *L(y) = {x ½ (x,y) Î S}*. Finally, the output set associated with this technology denotes all output vectors *y* produced from a given input vector *x*: *P(x) = {y ½ (x,y) Î S}*. These price-independent characterisations of technology are equivalent to: *(x,y) Î S Û x Î L(y) Û y Î P(x).*

It is important to define the output efficiency measure (output distance function). The radial output distance function is defined as:

$$DF^{r}\left(x,y\right)=min\left\{á \,\middle|\, á>0,\left(y/á\right)\in P\left(x\right)\right\}$$

With inefficiency in the production process: *0 < DF(x,y) £ 1*. With efficient production on the boundary of the production possibility set *[P(x)]*: *DF(x,y) = 1*.

In order to illustrate this option graphically, let us assume the existence of two outputs (in-patient days y_d and number of cases treated y_c) and two inputs, variable and fixed inputs *(*x_v *and* x_f*)*, as presented in Figure 1. As can be seen in this example, the radial distance function for unit A is defined as:

[Figure 1]

$$DF^{r}_{A}\left(x_v,x_f,y_d,y_c\right)=\left\{á \,\middle|\, á=0A/0B',\left(y_d/á,y_c/á\right)\in P\left(x_v,x_f\right)\right\}$$

In a more general case, the linear program to quantify the radial distance function, in a variable returns to scale technology, is presented in the annex (program [A1]). It is worth noting that the solution to program [A1] allows the unit evaluated to reach the frontier by expanding all the outputs proportionally, so the average length of stay *(LOS)* in the frontier is exactly the same as in the observed value for the unit analysed:

$$LOS_A=LOS_{B'}=\left(y_d/y_c\right)=\left(\frac{y_d/a}{y_c/a}\right)$$

2.2.Non-radial output expansion controlling technical inefficiency and length of stay

The radial expansion of outputs is one way of reducing waiting lists. There are, however, more complex possibilities which incorporate the effect of two decision variables: 1) the elimination of the inefficiencies found and 2) the emulation of other units treating more cases with shorter length of stay.

The non-radial distance function definition corresponding to this case is:

$$DF^{nr}\left(x_v, x_f\, y_d, y_c\right) = min. \left\{ \acute{a} \;\middle|\; \acute{a} > 0, \left(y_d, y_c / \acute{a}\right) \in P\left(x_v, x_f\right) \right\}$$

For a general case, program [A2] presents the linear program that quantifies this new distance function. In Figure 2 we also present the frontier reference for this new case.

[Figure 2]

In Figure 2 we can observe how unit A can reach the frontier only by increasing the number of cases treated (point C'). In the special case of health care, point C' is more difficult than point B' because managers have to deal, at the same time, with two different kinds of decisions: the control of inefficiency and the adjustment of the length of stay.

Figure 2 also serves to display the effects of a badly designed incentive systems. If revenues depend on the number of stays (as was the situation in the Spanish public sector hospitals some time ago) hospitals will doubtless prefer a point D' approach as it is the easiest way to guarantee revenue. Point D' increases stays but not the number of cases treated, so there are effectiveness reasons to prefer point C' to point B' and point B' to point D'. Precisely, this order of preferences is in line with the relationships among the average lengths of stay:

$$LOS_{C'} < LOS_{B'} < LOS_{D'} ;$$
$$\left(\frac{y_d}{y_c / a^{nr}}\right) < \left(\frac{y_d / a^{r}}{y_c / a^{r}}\right) < \left(\frac{y_d / a^{nr}}{y_c}\right)$$

The hierarchy of preferences presented cannot be directly extended to other sectors. If, for instance, we consider the case of hotels, managers would probably prefer to have all the rooms occupied by known, long-stay guests (exactly the opposite preference to that of health care).

2.3. Maximal utilisation of capacity

There are other possibilities for the reduction of waiting lists, but all of them need more resources to be applied. One consists of increasing the utilisation of capacity by contracting more variable inputs in order to achieve the maximal utilisation of capacity. A good example of this strategy is found in the Basque Country where surgical productivity has increased by 60 % during the last 9 years due to the utilisation of equipment throughout the whole working day. In order to put this decision into practice, more doctors and other staff obviously had to be contracted, with the consequent increase in the total cost, but it is possible to link the increase in outputs to the estimated increase in total costs.

Taking into account this situation, the distance function together with the radial expansion of the outputs, is:

$$DF^{r,cap}\left(x_f\, y_d, y_c\right) = min.\left\{á \;\middle|\; á > 0, \left(y_d/á\, , y_c/á\right) \in P\left(x_f\right)\right\}$$

This distance function can be quantified by following Färe, Grosskopf and Kokkelenberg (1989). The program [A3.1] in the annex presents the linear program that gives the value of the distance function. The graphical illustration is also presented in Figure 3. It is worth noting that in program [3.1] variable costs do not imply any restriction. Thus, if in the optimum:

$x^{*}_{k,v} > x^{o}_{k,v}$, *the utilisation of the fixed capacity can be improved but it requires the consumption of additional variable inputs*

$x^{*}_{k,v} = x^{o}_{k,v}$, *the fixed capacity is used at its maximun degree*

Program [A3.1] is radial, but can be adapted to a non-radial distance function. In program [A3.2] we present the linear program, more in line with the objectives of health care organisations.

3. Spanish hospitals: data and variables in the sample

The sample of hospitals analysed and the input and output data were taken from the database EESRI[1] of hospitals operating in the Spanish national health service. We did not include specialised or long stay hospitals, and only those classified as general hospitals were considered (137 general hospitals with more than 200 beds).

In the outputs definition, the number of cases treated (discharges), the number of in-patient days and the external visits were chosen as variables which cover the different types of services performed. The specific definition of the variables is as follows:

1. *Number of cases in medicine and medical specialities*: number of discharges assigned to internal medicine or to the medical specialities that do not have specific treatment in other classifications
2. *Number of cases in surgery*: number of discharges assigned to general surgery and digestive system surgery, along with remaining surgical specialities not included in other classifications
3. *Number of cases in trauma surgery*
4. *Number of cases in obstetrics and gynaecology*
5. *Other discharges*
6. *Medicine and medical specialities in-patient days*: corresponds to overnight stays of patients assigned to internal medicine or to the medical specialities that do not have specific treatment in other classifications.
7. *Surgery in-patient days*: includes general surgery and digestive system surgery, along with remaining surgical specialities not included in other classifications.
8. *Trauma surgery in-patient days*
9. *Obstetrics and gynaecology in-patient days.*
10. *Other in-patient days*
11. *External visits*: medical care on an outpatient basis, for the diagnosis, treatment and monitoring of illness.

The inputs defined are the following:

FIXED INPUTS (number of beds corresponding to the following services):

Beds in medicine and medical specialities

Beds in surgery

Beds in trauma surgery

Beds in obstetrics and gynaecology

Beds in other specialities

VARIABLE INPUTS

Doctors in medicine and medical specialities

Doctors in surgery

Doctors in trauma surgery

Doctors in obstetrics and gynaecology

Doctors of other specialities

Other staff involved in care

Other staff not involved in care

Cost of purchased materials

In the selection of variables, as noted by Murray (1992), if we are interested in the final impact on hospital services, there are reasons to prefer variables of outcome (i.e. the number of patients treated weighted by its Group Diagnostic Related classification) to indicators of throughput (number of hospital days or the number of cases treated). Unfortunately, our database does not contain the required information and we therefore concentrate on the evaluation of the hospital activity rather than on the results in terms of production of health[2]. Using the terms indicated by Chillingerian and Sherman (1990), our application concentrates on the efficiency of hospital management, but the analysis could continue by focussing on the efficiency of health staff in producing real health services (the value of the health gained by patients). Table 1 shows the descriptive statistics of the variables chosen.

[Table 1]

Important differences in size among hospitals can be seen in Table 1. For this reason, all the programs presented in annex 1 have been defined in variable returns to scale technological reference.

By relating certain output and input variables we can calculate other variables that can help to explain what the initial situation is. For instance, Table 2 shows that, in spite of having a relatively close case-mix as all of them are general hospitals, there are significant differences, both in length of stay and in capacity utilisation. The findings of Martin and Smith (1996) for the English NHS can probably be applied here, which indicate that both health and social factors are significant determinants of length of stay variations. Table 2 confirms that there is potential to improve the use of existent capacity and to reduce the length of stay. The potential effect of these two policies is discussed in the next section.

[Table 2]

4. Radial, non-radial and capacity frontiers: empirical results

Using the specified variables, we ran programs [A1] to [A3.2] for each one of the 137 hospitals in the sample 5 times (one per speciality). Table 3 presents a summary of the results in the case of radial programs, while Table 4 presents the results corresponding to the non-radial programs.

[Table 3]

[Table 4]

In the radial case, Table 3 shows how, on average, only in the Medicine and Medical specialities case is the output expansion obtained from the control of inefficiencies enough to eliminate the waiting lists. Results corresponding to program [A3.1] show how, even with maximum level capacity, the waiting lists continue in Surgery and Obstetrics. In other words, waiting list control requires more than the control of inefficiency or the improvement in the use of capacity.

Table 4 presents almost the same picture. Waiting lists in Medicine can be controlled only by reaching the frontier without the need for more expenditure: “to control the waiting list there is no need to apply more resources” as some managers of the present Spanish central government claim[3]). The problem is that for Surgery and Traumatology the non-radial output expansion implies an output expansion that remains very far from what is needed in order to significantly reduce waiting lists. In addition, as can be observed in the results of the application of program [A3.2], the combination of the reduction in length of stay and the maximal utilisation of capacity only implies a 50% waiting reduction for these specialities and increases in the variable costs of 9.45 % and 6.70 %.

To sum up, the control of Spanish hospital waiting lists requires the application of different strategies:

1. The control of inefficiency only by increasing activity (as presented previously in Figure 1) is enough to eliminate the waiting list in Medicine and Medical specialities.

2. Increasing efficiency and controlling length of stay (as presented in Figure 2) almost eliminates the waiting lists in Obstetrics and Gynaecology.

3. In specialities such as Surgery and Traumatology, the only way to obtain a significant reduction in the waiting list is through the combination of policies which aim to control length of stay (as in day case surgery) with the maximal utilisation of capacity, but this policy implies the increase in variable costs.

4. The effective control of the waiting lists in Surgery and Traumatology requires the use of additional capacity, not present at the moment in the Spanish public network. This situation helps to explain why there are cases where the use of private hospitals in the provision of public health services is necessary in order to reduce the waiting lists. In recent years we have seen examples of this in both the Spanish and English experiences.

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ANNEX 1

LINEAR-PROGRAMS FOR DISTANCE FUNCTIONS QUANTIFICATION

1. Radial output expansion

$$DF^{r}\left(y_c, y_d, x_v, x_f\right) = \min_{a,z} .a \qquad [A1]$$

subject to :

$$x^{o}_{k,v} - \sum_{s=1}^{K} z_s \cdot x_{s,v} \geq 0 \qquad v = 1,\ldots,V$$

$$x^{o}_{k,f} - \sum_{s=1}^{K} z_s \cdot x_{s,f} \geq 0 \qquad f = 1,\ldots,F$$

$$-y^{o}_{k,c} / a + \sum_{s=1}^{K} z_s \cdot y_{s,c} \geq 0 \qquad c = 1,\ldots,C$$

$$-y^{o}_{k,d} / a + \sum_{s=1}^{K} z_s \cdot y_{s,d} \geq 0 \qquad d = 1,\ldots,D$$

$$\sum_{s=1}^{K} z_s = 1 \qquad s = 1,\ldots,K$$

2. Non-radial output expansion

$$DF^{nr}\left(y_c, y_d, x_v, x_f\right) = \min_{a,z} .a \qquad [A2]$$

subject to :

$$x^{o}_{k,v} - \sum_{s=1}^{K} z_s \cdot x_{s,v} \geq 0 \qquad v = 1,\ldots,V$$

$$x^{o}_{k,f} - \sum_{s=1}^{K} z_s \cdot x_{s,f} \geq 0 \qquad f = 1,\ldots,F$$

$$-y^{o}_{k,c} / a + \sum_{s=1}^{K} z_s \cdot y_{s,c} \geq 0 \qquad c = 1,\ldots,C$$

$$-y^{o}_{k,d} + \sum_{s=1}^{K} z_s \cdot y_{s,d} \geq 0 \qquad d = 1,\ldots,D$$

$$\sum_{s=1}^{K} z_s = 1 \qquad s = 1,\ldots,K$$

3.1. Radial output expansion and maximal utilisation of capacity

$$DF^{r,cap.}\left(y_c, y_d, x_f\right) = \min_{a,z} .a \qquad [A\ 3.1]$$

subject to :

$$x_{k,v} - \sum_{s=1}^{K} z_s \cdot x_{s,v} \geq 0 \qquad v = 1,\dots,V$$

$$x^{o}_{k,f} - \sum_{s=1}^{K} z_s \cdot x_{s,f} \geq 0 \qquad f = 1,\dots,F$$

$$-y^{o}_{k,c} \Big/ a + \sum_{s=1}^{K} z_s \cdot y_{s,c} \geq 0 \qquad c = 1,\dots,C$$

$$-y^{o}_{k,d} \Big/ a + \sum_{s=1}^{K} z_s \cdot y_{s,d} \geq 0 \qquad d = 1,\dots,D$$

$$\sum_{s=1}^{K} z_s = 1 \qquad s = 1,\dots,K$$

3.2. Non-radial output expansion and maximal utilisation of capacity

$$DF^{nr,cap.}\left(y_c, y_d, x_f\right) = \min_{a,z} .a \qquad [A\ 3.2]$$

subject to :

$$x_{k,v} - \sum_{s=1}^{K} z_s \cdot x_{s,v} \geq 0 \qquad v = 1,\dots,V$$

$$x^{o}_{k,f} - \sum_{s=1}^{K} z_s \cdot x_{s,f} \geq 0 \qquad f = 1,\dots,F$$

$$-y^{o}_{k,c} \Big/ a + \sum_{s=1}^{K} z_s \cdot y_{s,c} \geq 0 \qquad c = 1,\dots,C$$

$$-y^{o}_{k,d} + \sum_{s=1}^{K} z_s \cdot y_{s,d} \geq 0 \qquad d = 1,\dots,D$$

$$\sum_{s=1}^{K} z_s = 1 \qquad s = 1,\dots,K$$

Figure 1. Radial output expansion

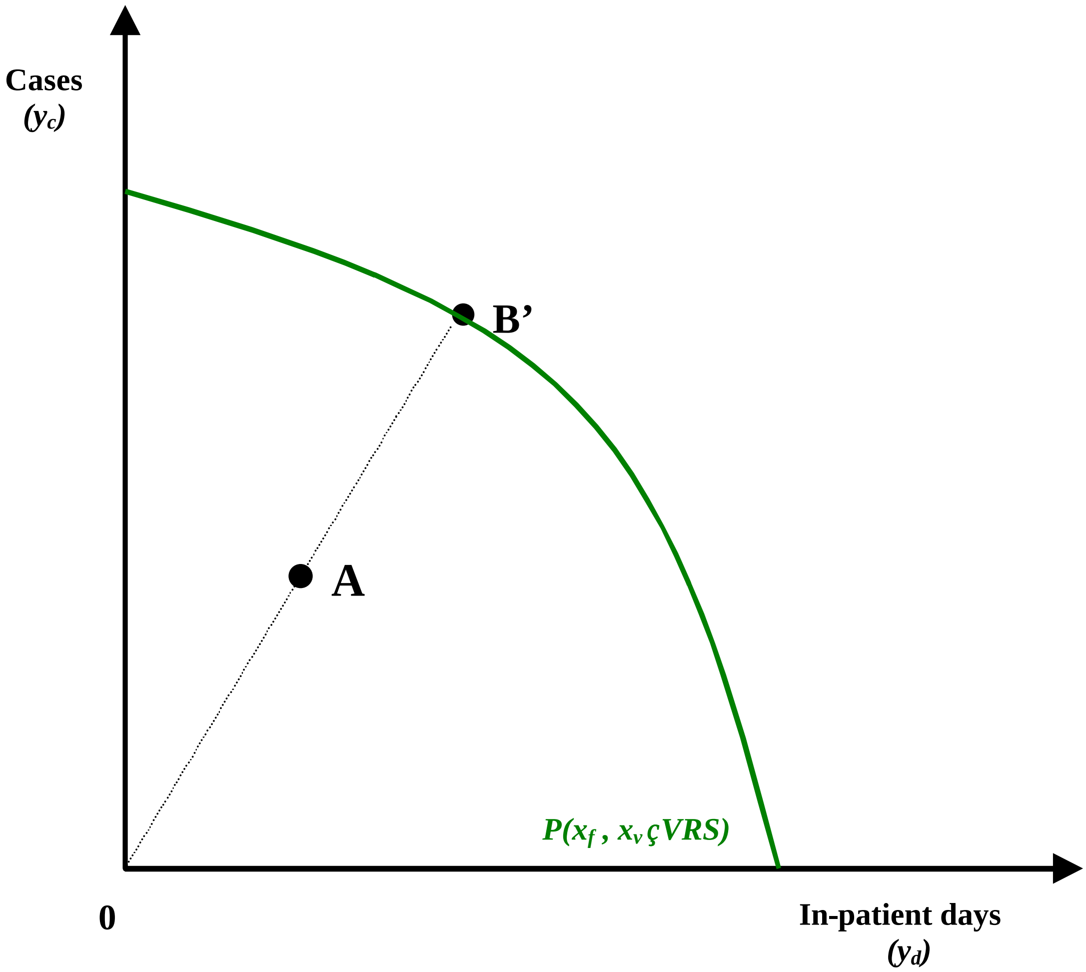

Figure 2. Non-radial output expansion

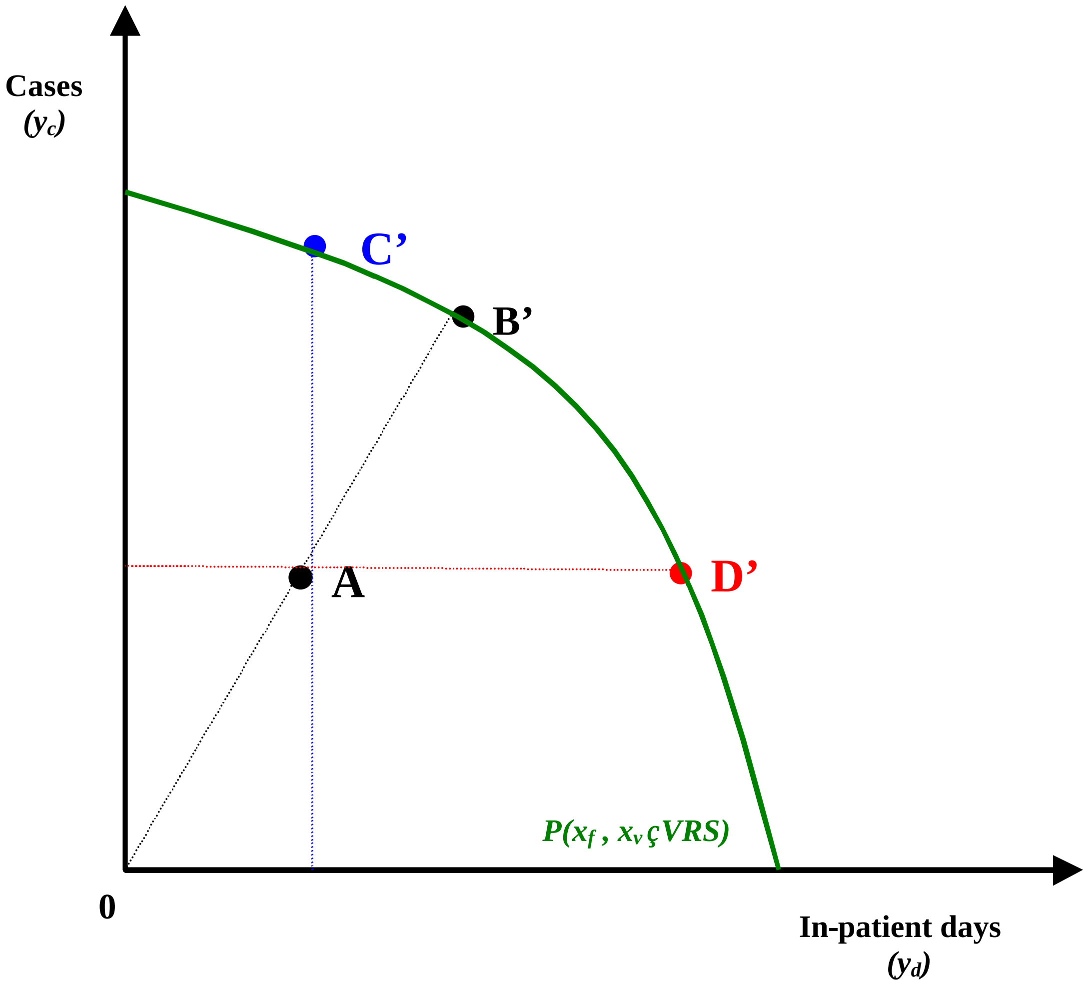

Figure 3. Maximal utilisation of capacity

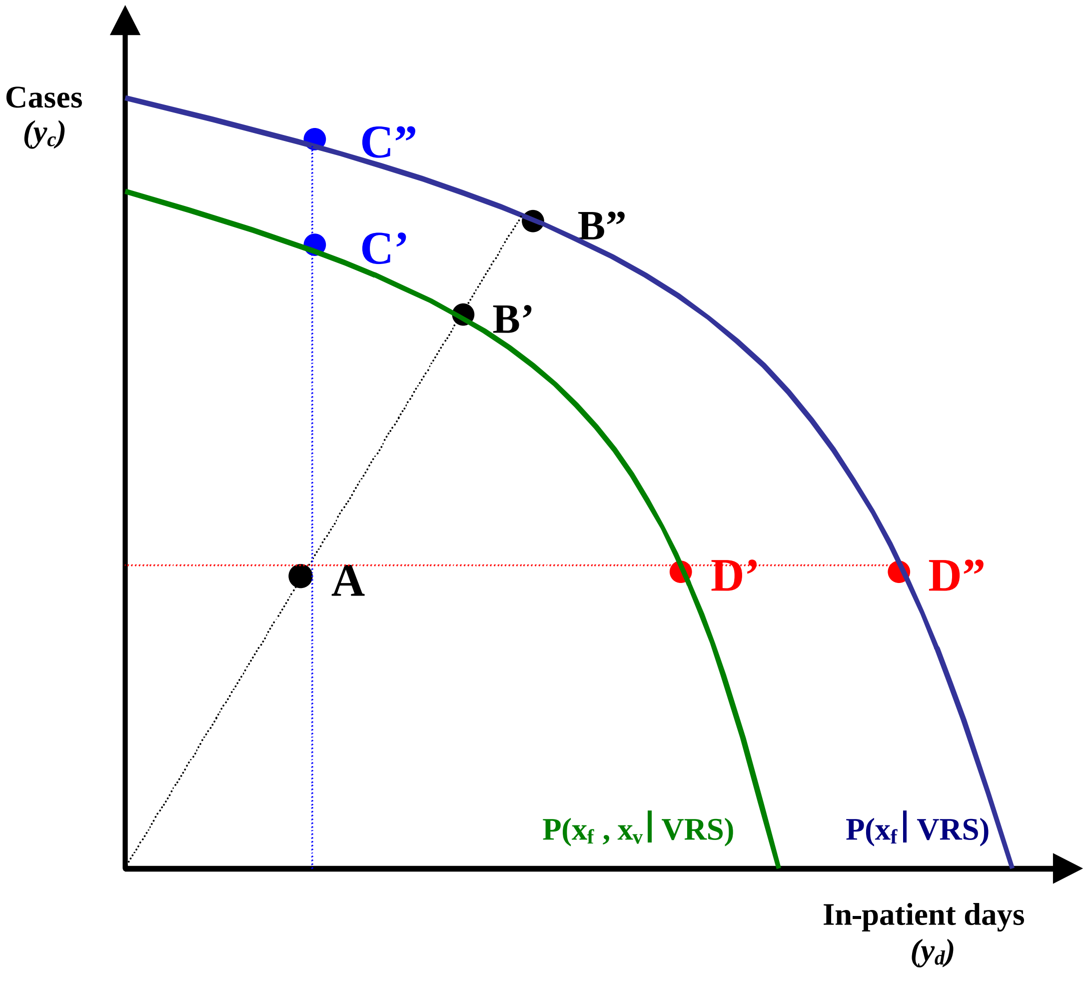

Table 1. Descriptive statistics of outputs and inputs

		Mean	Standard deviation	Maximun	Minimun
OUTPUTS					
Cases	**Medicine**	6 645.23	3 923.70	18 074.00	1618.00
	Surgery	5 437.12	3 225.35	15 049.00	397.00
	Traumatology	1 564.97	853.73	5 256.00	0.00
	Obstetrics and Gineacology	3 529.27	3 434.73	19 658.00	0.00
	Other	3 908.12	3 734.74	19 288.00	0.00
In-patient days	**Medicine**	66 740.66	42 795.98	227 040.00	14 869.00
	Surgery	45 263.39	30 876.78	135 705.00	1 189.00
	Traumatology	16 024.23	9 405.53	48 203.00	0.00
	Obstetrics and Gineacology	16 268.16	14 888.53	87 732.00	0.00
	Other	26 761.77	26 571.95	139 682.00	0.00
External visits		159 007.64	98 274.04	480 810.00	25.361.00
FIXED INPUTS					
Beds	**Medicine**	190.89	121.29	689.00	190.89
	Surgery	156.77	106.52	570.00	4.00
	Traumatology	55.45	30.91	182.00	0.00
	Obstetrics and Gineacology	60.19	52.85	276.00	0.00
	Other	106.53	93.17	433.00	0.00
VARIABLE INPUTS					
Doctors	**Medicine**	70.82	67.45	550.50	15.23
	Surgery	51.95	38.48	185.50	12.62
	Traumatology	15.82	10.81	62.00	0.00
	Obstetrics and Gineacology	17.01	14.24	75.00	0.00
	Other	115.47	82.93	417.50	0.00
Other staff involved in care		866.41	670.71	3 657.00	193.33
Other staff not involved in care		367.26	294.81	1 685.66	44.90
Cost of purchased materials (mill. of Spanish pesetas)		3 100.88	2 536.93	13 322.52	397.83

Table 2. Observed lenght of stay and capacity utilisation rate

	Mean	Standard deviation	Maximun	Minimun
LENGHT OF STAY (days)				
Medicine	9.91	1.58	14.66	6.28
Surgery	8.01	1.94	15.48	2.99
Traumatology	10.15	3.05	18.75	-
Obstetrics and Gineacology	4.73	1.72	12.00	-
CAPACITY UTILISATION (in %)				
Medicine	96.78	13.20	138.52	47.67
Surgery	78.59	10.72	114.96	45.84
Traumatology	77.48	16.19	111.58	-
Obstetrics and Gineacology	68.53	20.57	123.94	-

Table 3. Radial distance functions

	Waiting lists	Output expansion Program [A1] $\left(\frac{1}{a}-1\right)\cdot 100$	Maximal utilization of capacity Program [A3.1] $\left(\frac{1}{a}-1\right)\cdot 100$
MEDICINE			
Percentage of observed number of cases (arithmetic mean)	0.83 %	3.62 %	6.80 %
Maximum	48.01 %	28.35 %	52.53 %
Minimum	0.00 %	0.00 %	0.00 %
Increase in variable costs		0.00 %	2.23 %
SURGERY			
Percentage of observed number of cases (arithmetic mean)	32.90 %	3.87 %	7.31 %
Maximum	163.55 %	24.66 %	28.92 %
Minimum	0.00 %	0.00 %	0.00 %
Increase in variable costs		0.00 %	5.11 %
TRAUMATOLOGY			
Percentage of observed number of cases (arithmetic mean)	41.40 %	4.16 %	7.44 %
Maximum	158.78 %	31.04 %	101.53 %
Minimum	0.00 %	0.00 %	0.00 %
Increase in variable costs		0.00 %	4.27 %
OBSTETRICS AND GYNAECOLOGY			
Percentage of observed number of cases (arithmetic mean)	7.15 %	4.09 %	8.42 %
Maximum	65.32 %	32.14 %	97.67 %
Minimum	0.00 %	0.00 %	0.00 %
Increase in variable costs		0.00 %	1.02 %

Table 4. Non-radial distance functions

	Waiting lists	Output expansion Program [A2] $\left(\frac{1}{a}-1\right)\cdot 100$	Maximal utilization of capacity Program [A3.2] $\left(\frac{1}{a}-1\right)\cdot 100$
MEDICINE			
Percentage of observed number of cases (arithmetic mean)	0.83 %	4.35 %	19.60 %
Maximum	48.01 %	49.22 %	151.10 %
Minimum	0.00 %	0.00 %	0.00 %
Increase in variable costs		0.00 %	8.88 %
SURGERY			
Percentage of observed number of cases (arithmetic mean)	32.90 %	5.68 %	20.81 %
Maximum	163.55 %	57.13 %	162.30 %
Minimum	0.00 %	0.00 %	0.00 %
Increase in variable costs		0.00 %	9.45 %
TRAUMATOLOGY			
Percentage of observed number of cases (arithmetic mean)	41.40 %	5.35 %	20.34 %
Maximum	158.78 %	49.95 %	188.83 %
Minimum	0.00 %	0.00 %	0.00 %
Increase in variable costs		0.00 %	6.70 %
OBSTETRICS AND GYNAECOLOGY			
Percentage of observed number of cases (arithmetic mean)	7.15 %	6.11 %	21.23 %
Maximum	65.32 %	49.69 %	170.03 %
Minimum	0.00 %	0.00 %	0.00 %
Increase in variable costs		0.00 %	7.78 %

[1] Estadística de Establecimientos Sanitarios con Régimen de Internado, 1995. Spanish Ministry of Health and Consumption.

[2] In order to verify the impact of the results when considering throughput and outcome variables in Spanish hospitals, there is a very detailed study which refers to another sample of Spanish hospitals (see Calzado, García, Laffarga and Larrán, 1998); this points out the differences and the associations in the results according to the specification of outputs.

[3] See quotes from the head of the Spanish Budget Office in May 2000 (el Pais, May 26, 2000, pp. 33). According to Elvira Rodriguez, the problem is not the lack of financial resources, but the efficiency in the management of the existent resources.