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FINANCING HOSPITALS BASED ON CASE-MIX : THE SITUATION IN PORTUGAL

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1. Introduction and purpose

In 1987 the decision to use DRGs as a funding tool for hospital inpatient care was taken in Portugal. As a result, the implementation of a resource allocation model for the National Health Service (NHS) component started in 1990 whereby hospital budgets are set partly on the basis of their DRG production. Per case payments at DRG national rates were also established for the non-NHS component of the hospitals' inpatient revenue.

This was a very significant step not only for Portugal but also for Europe, because it represented the first real experience with DRGs in Europe at a national level and the first time that DRGs were used for budgeting in addition to per case payments.

The objective of this paper is not to describe in detail the Portuguese DRG based funding system, for that has already been done elsewhere (Bentes et. al. (1993); Urbano et. al. (1993), Bentes and Gonsalves (1992), Bentes, Urbano and Hindle (1989). Instead the purpose is to recall the main features of the system and to illustrate the status of its implementation, with emphasis on what are considered to be the main achievements.

The system is currently not a complete one, and therefore enhancements are planned for over the next years. In this regard short and medium term actions which will include the extension of the resource allocation methodologies to the hospital outpatient sector are also referenced.

2. Brief overview of the DRG project

The portuguese government has been committed in principle to output-based funding of hospital care since 1981. It was hoped that such a system would result in a more rational allocation of resources for inpatient care and that it would give hospital administrations the incentive for more efficient management. Progress was, however, difficult due mainly to weak hospital information systems, including both resource use and clinical data. In 1984 a project was initiated at the Ministry of Health to study the feasibility of implementing Diagnosis Related Groups (DRGs) to define the hospitals' output of treated cases. Because the results of this preliminary project were most encouraging, it was decided that the system should be extended to all public acute care hospitals and that its use as a resource allocation tool should be considered.

Several actions were taken in this regard: diagnosis and procedure coding was changed to ICD-9-CM and training courses in coding for physicians were implemented. Although most of the hospitals in Portugal had centralised medical records departments, there were few specialised professionals in this area. As the training of medical coders was not feasible in the short run, the Ministry of Health decided that physicians should be assigned responsibilities for coding activities.

A standard microcomputer-based discharge abstract with a DRG grouper package was also implemented at the hospital level, including a simple management module. All hospitals had staff trained in its use, and grouping started to be done on an ongoing basis at each hospital from January of 1989.

Finally, in 1990 the public hospitals' production in DRG terms (hospital case-mix) was for the first time used to define their funding requirements for inpatient care.

3. Design of the DRG based funding system

The design of the DRG based funding system took into account that the public hospitals have two major sources of inpatient funds:

- the National Health Service (NHS) component, which represents between 80% and 85% of total inpatient revenue, and
- the third party payors component (mainly occupational insurance), which represents between 15% to 20% of total inpatient revenue.

For the latter, a real prospective per case payment model was designed in which national DRG rates are set that reflect national average costs.

Increased funds are provided for long-stay outliers and reduced funds are provided for short-stay outlier and transfer cases. Short-stay outliers are credited to the hospital at 100% of the DRG per diem national rate, for the number of short-stay outlier days. Cases classified as long-stay outliers are given an additional amount of 60% of the DRG per diem rate for each day over the threshold. Most transfers are treated in the same manner as short-stay outliers, in that the transferring hospital is credited the number of transfer days at the DRG per diem rate up to 50% of the DRG rate. For two kinds of transfers (burns and neonatal cases) the transferring hospital is credited at the appropriate DRG rate.

The objective of the NHS component of the funding system is to increase the effectiveness of distributing a total health care budget which is determined by a political and social process largely external to the health sector itself. Thus, as a starting point, this model was designed as a budget allocation instead of a per case payment. The intention is to compute a budget for each hospital based on the number of cases it is expected to treat in each DRG and to adjust this budget at the the end of the year to take account of differences between actual and expected number of patients.

The context in which public hospitals operate further influenced the design of the payment formula, in order to control for the impact on hospitals of unexpected resource shifts, while providing opportunities for improvement. In spite of being the main provider, the government is also the dominant payor of care, being responsible for the financial solvency of its hospitals. Thus NHS hospitals cannot be allowed to accumulate large surplusses nor be allowed to go bankrupt. In addition, the hospital staff (including physicians) are salaried and the manpower management model is entirely dependant on government regulations, with little flexibility in terms of adjusting staffing levels and mixes. As a consequence, personnel expenses which represent on average 65% of operating costs are rather inflexible. Finally, the prior budget allocation process has resulted in different cost patterns among hospitals which are not accounted for by the DRGs.

These constraints have been considered by allowing cost differences between the hospitals in defining the DRG rates. In practice, the allocation amount for a given hospital is based on a blend of the hospital specific and a standard cost per case. It is, however, intended that the hospital's specific component declines over time. The objective is to gradually reach payment rates which will be evenly divided between hospital specific and standard cost per case, while giving the hospitals opportunity to learn and adjust to the system.

The blending percentage implemented in 1990 was set at 90% hospital specific and 10% national rate. In accordance with the proposed schedule the hospital specific component decreased in 1991 to 85%.

The blending approach using national average costs proved however to be insufficient to control the excessive resource shifts across the hospitals. In fact, one of the more difficult conceptual issues in the use of DRGs to allocate budgets to hospitals in Portugal has been the fact that there is systematic variation in hospital costs which is related to factors in addition to those captured by the DRGs. As a practical matter, hospital costs are influenced by the role that the hospital plays in delivering health care and this role is not accounted for by simply adjusting for case-mix. Thus, additional adjustments needed to be built into the budgeting process which reflect these roles, to guarantee that certain hospitals would be not penalised for their specificity.

In support of this philosophy, groups were implemented for hospital budgeting starting in 1992. The definition of groups is always a controversial process to the extent that any discrete categorisation cannot reflect accurately the complex and multifunction nature of a hospital. On the other hand, groups can be useful for planning and to control the diffusion of high cost new technologies by only recognising certain costs and/or types of treatment at specific types of hospitals.

The hospital component was set in 1992 at 80% and blending was implemented with group average costs instead of national average costs. The blending percentage was subsequently set at 75% hospital specific both for 1993 and 1994 and was provisionally set at 70% for 1995 budget year.

Currently the DRG resource allocation model basically computes a hospital inpatient budget by multiplying the number of patients that the hospital is expected to treat during the forthcoming year times its blended rate and times its case-mix index. A key component of this methodology, the case-mix index, is determined using a set of national DRG cost weights which express the relationship of one DRG to another in terms of their resource requirements.

Adjustments are applied to the basic formula to account for differences in cost related to outlier and transfer cases. These funds are reflected in each hospital's number of discharges, using the concept of discharge equivalents, whereby short stay, long stay and transfer days are expressed in terms equivalent to inlier cases. Finally each hospital's allocation level is adjusted by a factor that ensures the overall budget neutrality of the resource allocation system.

4. Data sources

Three data sources are used to determine the DRG cost weights and the hospital allocation levels: ongoing hospital DRG discharge data, annual hospital cost report information, and service weights developed and used by the Maryland's Medicaid program in the US..

The discharge data are collected at each hospital using a computerised data collection process. This system collects patient demographic information (e.g., birthdate, sex), financial responsible entity, length of stay, diagnoses, surgical procedures, transfer information and disposition status for each discharge and assigns the appropriate DRG*. Each hospital forwards its data in floppy disks on a monthly basis to IGIF (a Public Institute at the Ministry of Health), to be integrated into a national database which is used for rate setting and budgeting.

In addition, cost report information is submitted to IGIF on an annual basis. These data include costs and expenditures for each hospital and for each cost centre within the hospital.

The next step, assigning specific costs to each DRG requires that data on hospital costs be available at the patient level. This is not the case in Portugal where cost information is available only at the cost centre level. This obstacle was overcome by using information from an external source (The US Maryland Service Weights) in combination with cost and length-of-stay information from the Portuguese hospitals.

The Maryland Service Weights reflect the cost of a service relative to other services in each DRG. By assuming that Portuguese hospitals have the same pattern of service use as hospitals in Maryland but at different levels, we could determine the relative costs of each of the services that comprise total inpatient costs by DRG.

Specifically, a method was devised to convert cost centre costs to DRG-specific costs. Analysis of hospital's financial reports showed that costs for some services (e.g. physician, nursing, hotel) vary with length of stay, while other services (e.g. ancillaries) are mainly associated with the number and type of patients. Thus the first step involved classification of costs as reported in the accounts of each hospital, into length of stay or patient type related costs. Next, total hospital costs by type of service were broken down to either a cost per day or a cost per patient amount depending upon the service. Finally these costs were, with the exception of physician and administrative costs (there are no service weights available), associated with the Maryland Service Weights so that the relative costs for each could be determined by DRG.

* Until January 1994 discharge data were grouped using HCFA Grouper V. 6.0. Currently the DRG version is HCFA 10.0

This method led to hospital cost-based DRG relative values that could be used to calculate the national DRG cost weights. More recently (1994) and in order to validate these DRG cost weights, panels of physicians from different specialities were set up. The intention was to provide additional input to the initial cost weights based on their clinical expertise and experience, while involving them in the decision process for resource allocation. This validation work was targeted, in a first phase, to ophthalmology, cardiology, cardiothoracic surgery, orthopedics and burns, as these were the areas where most of the criticisms concerning the DRG weights had been concentrated.

As a result, some of the weights were modified and the whole set was re-normalised to keep the cost of the national average patient as the reference value. The final set of DRG cost weights were then used to compute the DRG rates and the hospitals case-mix indices.

5. Achievements

In spite of the difficulties associated with the operation of the system, the objectivity and rationality of this approach to setting budgets have been seen as positive aspects.

By setting national rates, the DRGs also made the system more equitable for the payors, in that the NHS pays its share and the other payors pay comparable amounts. Prior to implementing DRGs as a payment tool, hospitals were paid for the non-NHS patients on a per diem basis at rates that were, in most cases, lower than the real costs of the services provided. As a consequence, the hospitals and therefore the NHS were supporting a considerable financial burden of the third parties' responsibility. It is worth noting that the billing amounts to third party payors increased more than 100% between 1991-1994 whereas the corresponding increase between 1987-1990 was only about 30%.

Hospital activity in terms of total discharges increased by 10% between 1990 and 1993 (Fig 1). Inlier cases also exhibited the same pattern of variation coupled with a decrease in the number of long stay cases, an increase in short stay cases and a stabilisation of transferred patients (Fig. 2).

Overall hospital length of stay (ALOS) continued to decrease although not at a very significant pace (0.5 days corresponding to a change of 6,25%), (Table 1). This trend was observed both for medical and for surgical DRGs (Table 2) but at different levels.

Overall ALOS is not by itself a meaningful indicator of efficiency, since the effect of changes in case-mix are not apparent. However the joint effect of an increase in case mix and a decrease in length of stay can be seen as a positive result (Table 1). The specific variation in ALOS for the most frequent and for the most resource consumptive DRGs (Fig. 3 and 4) corroborates this finding.

These are, in general, expected results to the extent that one of the major advantages of DRG based funding is that it creates incentives for hospitals to operate more efficiently. Using a hospital's output of treated cases to establish the basis for its funding provides that hospital with the financial incentive to treat more cases and to treat them as efficiently as possible. A funding system though, is much more than just a payment formula and therefore the results of its implementation have to be analysed beyond the changes of mere statistical indicators.

The status of implementation of the DRG system by the end of 1994 can be summarised in a series of achievements which outweigh the specific objectives of resource allocation and payment. These are briefly presented below:

- All public acute care hospitals with the exception of psychiatric and rehabilitation facilities are covered by the system, producing case-mix information on a routine basis;
- a basic DRG hospital information system is established whereby hospital managers are provided with tools that enable them to better understand their production and to communicate with physicians in a common language. This leads to a more successful establishment and monitoring of objectives and targets for the services;
- a centralised national DRG database with over 3,5 million records containing administrative and clinical information at the patient level is available for statistical analysis, morbidity studies and quality and utilisation reviews;
- finally a so called "case-mix culture" is diffused across the country providing a useful commonality of conceptual and operational attitudes toward hospital management and financing.

6. Future Perspectives

The current DRG resource allocation model only includes inpatient care. Ambulatory services are reimbursed from the National Budget on the basis of previous year's amount adjusted by inflation. This difference in funding philosophies is preventing the system from providing global positive incentives to the hospitals, as these are not encouraged from a financial point of view, to enhance outpatient care as an alternative to inpatient admissions when clinically appropriate. In practice, the individual hospitals attempt to obtain the maximum revenue from both systems, i.e. classifying outpatient procedures as admissions when this situation appears to be financially more attractive.

A particular controversial issue has been the ambulatory surgeries and day care, since the funding system does not provide differential rates for these modes of care. Hospitals claim that these cases should be covered by the DRG allocations, once the ambulatory budget does not provide adequate payment for this complex services. The DRG system, on the other hand, only provides short-stay credits for these cases, as the low threshold is, for most DRGs set at one day; yet one should recognise that the cost of a day case is higher than the cost of one day of a continued hospitalisation for a similar clinical situation.

As a medium term solution, the Ministry of Health intends that an approach similar in concept to the DRGs, will be implemented for ambulatory care. The intended approach will eventually use the Ambulatory Patient Groups (APGs) as the basis for the ambulatory budgets. This system, however, will need much more modification prior to its use in Portugal than has been the case for the DRG system. There is no reason to believe that national differences will be a source of difficulty but there are obvious differences in terms of organisational and treatment modalities, as well as of coding schemes.

In this regard, a project is been undertaken to produce an uniform nomenclature of acts for ancillary services and selected procedures, including the assignment of relative values. Panels of physician specialists make their best estimates of the cost relativities of the different acts in their area of expertise, after agreeing on the choice of a baseline test which is given the value of 1. A nominal group technique approach has been chosen as the preferable method to generate consensus and as a starting point, existing relative value scales from other countries were reviewed and modified to reflect the differences of practice in Portugal. To date, a list of nomenclatures and associated relative values has been finalised for Imaging, Cardiology, Clinical Pathology, Ophthalmology, Gastrentrology, Pneumology, MFR and Urology. During 1995 other areas will be covered according to a list of approved priorities.

The resultant procedure codes and relative values will be used, in conjunction with ICD-9-CM diagnoses codes, as a global coding scheme for the assignment of APGs to portuguese ambulatory data.

A feasibility study for the use of APGs is scheduled to start at the end of 1995 in two pilot hospitals, focusing on three speciality areas: Cardiology, Pneumology and Urology. The results of this experience are expected to lay the basic foundations for a project to use APGs (or an adaptation of the system) as the basis for funding the hospital ambulatory sector. It could be that we will focus on surgical APGs as these respond to our most immediate problem. Including medical and ancillary service APGs into the resource allocation system will be more difficult as this imposes data reporting burden on the hospitals. However, we may also find that the burden for hospitals is manageable and that physicians demand this kind of approach due to equity considerations. Responding to these kind of questions is one purpose of the pilot test.

As an intermediate solution and as part of the short term actions, work is being conducted to define a prospective payment system for ambulatory surgery and day hospitalisation, using DRGs as the basis for classification and rate setting. The proposed methodology simply treats these cases as "zero days" stays and discounts the DRG weights to accommodate the room and board portion of hospital inpatient expenses.

7. Concluding Remark

This paper outlined Portugal's approach to funding its public hospitals based on case-mix and briefly pointed to some of the short and medium term actions envisioned for building a more comprehensive system.

If the experience were to be summarised in a couple of key words, pragmatism and flexibility would be the chosen ones. Pragmatism because it was better to start with a simple although unperfect system than wait for some eventually unattainable level of perfection. If changes had been made only when the data available were perfect and solutions were proven and when everybody was ready to accept them as optimal, progress would have surely been very slow. Flexibility because judgement has been combined with prudence, allowing the system to change overtime by continuously reviewing and revising the chosen solutions.

In spite of the problems that almost invariably accompany change and of the operational difficulties of implementing an efficiency oriented system in a National Health Service environment, it is our view that the portuguese experience with DRGs has been highly positive and should be continued.

FIGURE 1

EVOLUTION OF NUMBER OF PATIENTS BY TYPE OF CASES

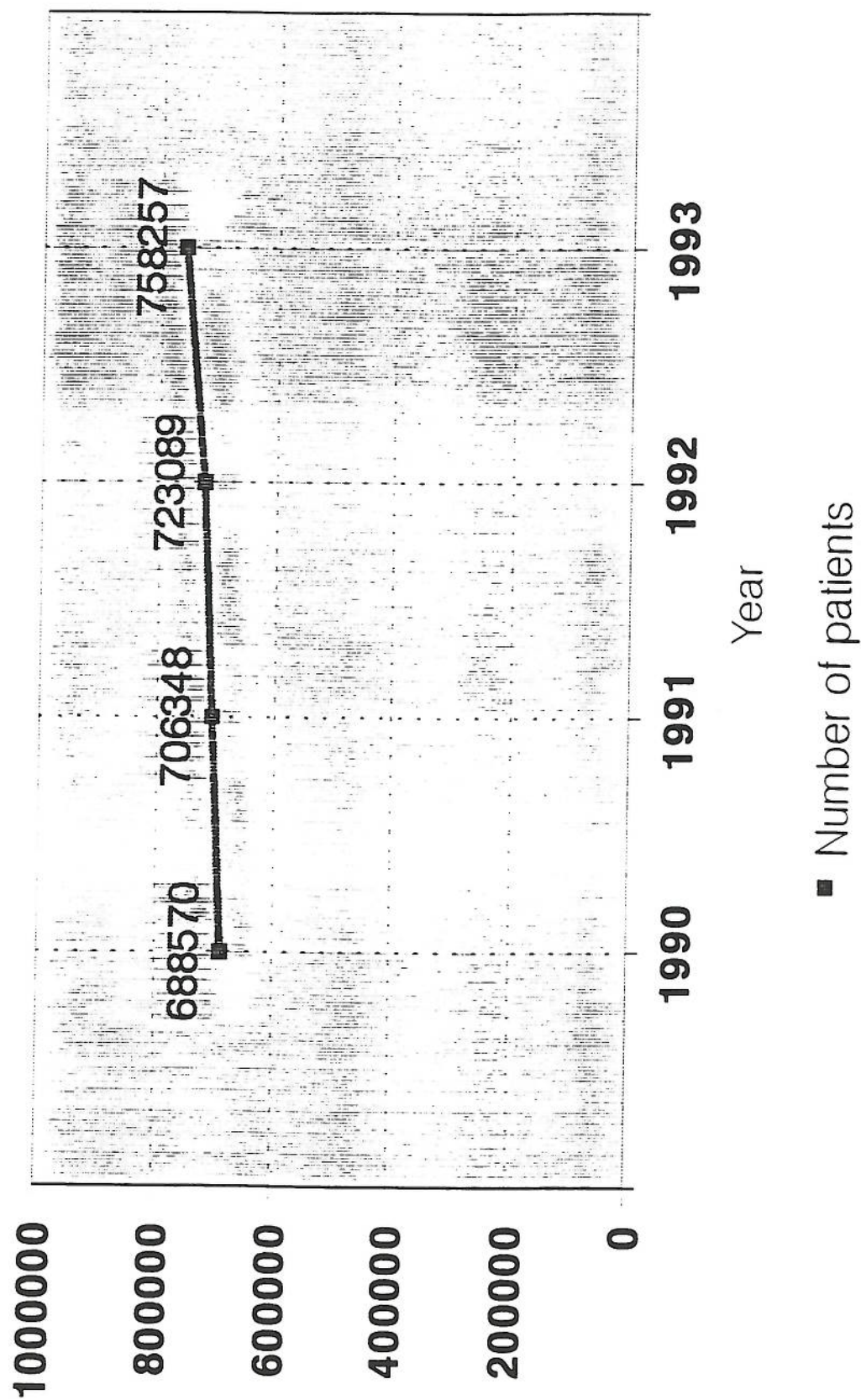


FIGURE 2

EVOLUTION OF NUMBER OF PATIENTS BY TYPE OF CASES

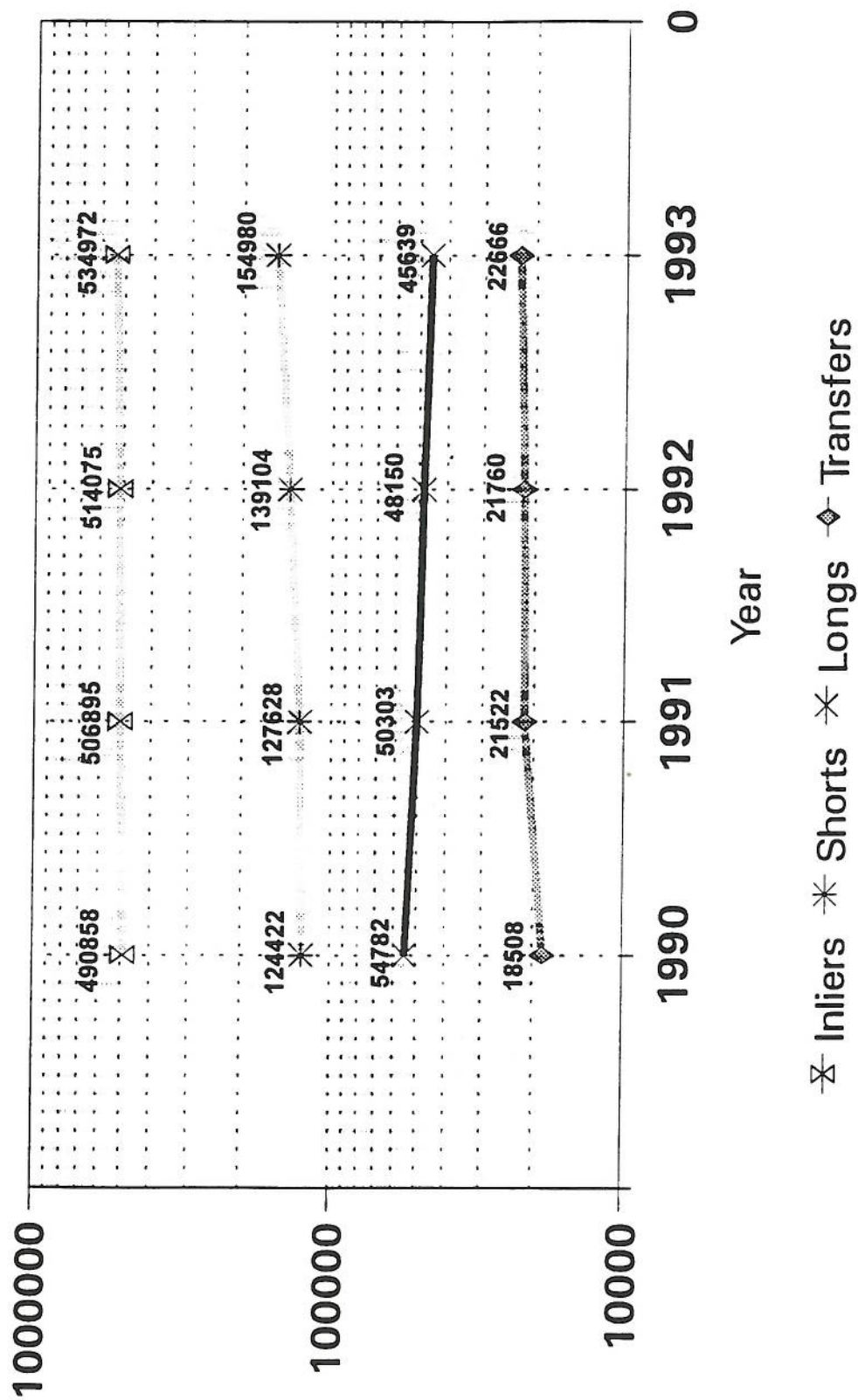


TABLE 1
OVERALL AVERAGE LENGTH OF STAY
1990 - 1993

YEAR	1990	1991	1992	1993
ALOS	8,5	8,4	8,2	8,0
CMI	0,95	0,97	0,98	0,98
WEIGHTED ALOS	8,95	8,65	8,36	8,16

(EXCLUDES DIED AND TRANSFERRED CASES)

Source: IGIF / DDSFG, 1994

TABLE 2

AVERAGE LENGTH OF STAY VARIATION
1990 - 1993

TYPE OF DRGs	ANNUAL VARIATION (%)			
	1990-1991	1991-1992	1992-1993	1990-1993
MEDICAL DRGs	- 1.32	- 2.40	- 3.46	- 7.02
PROCEDURE DRGs	- 4.40	- 3.99	- 4.89	-12.71

Source: IGIF / DDSFG, 1994

TABLE 3

ALOS COMPARISON FOR THE TEN MOST FREQUENT DRGs (*)

DRG	NAME	ALOS		% VARIATION 1990 - 1993
		1990	1993	
410	Chemotherapy	2.66	2.07	- 22.18
371	Cesarian Section W/O CC	6.82	6.16	- 9.68
14	Specific Cerebrovascular Disorders Except TIA	13.81	12.12	- 12.23
127	Heart Failure & Shock	10.98	10.08	- 8.19
390	Neonate w other Significant Problems	3.69	3.73	1.08
167	Appendectomy W/O CC	4.86	4.39	- 9.67
359	Uterine & Adnexa Proc. For Non- Malignancy W CC	8.88	7.85	- 11.59
389	Full Term Neonate W Major Problems	6.06	5.84	- 3.63
162	Inguinal e Femoal Hernia Procedures Age > 17 W/O CC	7.19	5.72	- 20.45
381	Abortion W D & C, Aspiration Curetage or Hysterotomy	2.00	1.91	- 4.5

(*) EXCULPES NORMAL NEWBORNS (DRG 391) AND VAGINAL DELIVERIES WITHOUT COMPLICATING DIAGNOSIS (DRG 373)

Source: IGIF / DDSFG, 1994

TABLE 4

**ALOS COMPARISON FOR THE TEN MOST RESOURCE INTENSIVE
DRGs (*)**

DRG	NAME	ALOS		% VARIATION
		1990	1993	
14	Chemotherapy	13.81	12.12	- 12.23
371	Cesarian Section W/O CC	6.82	6.16	- 9.68
211	Hip e Femur Procedures except Mapa joint Age > 17 W/O CC	25.39	20.77	- 18.19
127	Heart Failure & Shock	10.98	10.08	- 8.19
359	Uterine & Adnexa Proc. For Non- Malignancy W CC	8.88	7.85	- 11.59
209	Major joint e Limb Rrattachment Proced.	27.70	22.33	19.39
410	Chemotherapy	2.66	2.07	- 22.18
219	Lower extremity & Humer Proc. except Hip, Foot, Femur Age >17 W/O CC	19.74	15.79	- 20.01
389	Full Term Neonate W Major Problems	6.06	5.84	- 3.63
202	Cirrhosis & Alcoholic Hepatitis	16.72	14.99	- 10.35
198	Total Cholecystectomy w/o CDE w/o cc	11.42	8.76	- 23.29

(*) EXCLUDES NORMAL NEWBORNS (DRG 391) AND VAGINAL DELIVERIES
WITHOUT COMPLICATING DIAGNOSIS (DRG 373)

Source: IGIF / DDSFG, 1994

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