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**PROBLEMES ACTUELS
EN MATIERE DE COHESION SOCIALE**

Summary
Towards a prospective financing of inpatient drugs and medical services

Résumé
Financement plus forfaitarisé des médicaments et des prestations médicales

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Summary
Towards a prospective financing of inpatient drugs and medical services

1 Introduction

Confronted to the growth of hospital expenditure, and as the political authorities show a will to reduce the deficit of the public finance, it has become more and more important to develop needs and performance indicators so that both the use of the resources and the quality of care can be measured; such measurements should allow to conciliate quality, equity and efficiency.

A good indicator should help setting up a financing system that would be at the same time equitable and effective. Indeed, only a stock management presenting these properties will make it possible to maintain the access for all to care of quality, and in particular to all the drugs, including the very expensive new drugs.

Within this framework of reflection, the government put as a priority in its program the objective of an evaluation of the hospital drugs expenditures and a move towards a partially prospective financing. Nevertheless, a prospective financing system only based on the historical expenditure would support hospitals that tend to consume more drugs. This is why it is necessary to fix the hospitals budgets so that they can provide everyone with effective care.

This reflection on prospective payments starts with drug expenditure but the government also evoked other tracks; in particular projects have been developed in order to rationalise expenditure relating to the services of radiology, clinical biology and internal medicine.

However, in this process towards a more prospective payment of drug expenditures, it is necessary to put forward the medical evaluation of prescription. It is only by improving the quality of the prescription that a control of the expenditure could be obtained without penalising the quality of care. The current research, carried out for the SSTC, comes after a series of previous researches carried out since 1996 for the Ministry for the Social Affairs, Public Health and Environment.

The first part of this study will be an analysis of criteria that could be used to build a prospective financing system able to reach efficiency while maintaining quality and accessibility to health cares; the study will mainly focus on the hospital expenditure in pharmacy, clinical biology and radiology.

The second part will focus on a critical evaluation of two concrete measures suggested in 2002 by the Ministry for the Social Affairs:

> 1° the prospective financing of radiology, internal medicine and clinical biology expenditures for 28 groups of pathologies through a system called « Montants de référence »

> 2° the partially prospective financing of drugs expenditures relating to 7 main categories of drugs.

2   1st part: Prospective financing models

2.1   Presentation of the database

The database on which the analyses were carried out includes approximately 1,370,000 stays related to inpatients; these stays were recorded during the years 1996 and 1997. They relate to 77 hospitals, among which 4 are considered as teaching hospitals.

 For each stay, the data base informs both the APDRG and the APR-DRG (and the level of severity) and some invoicing variables (drugs expenditures split by ATC categories or by refunding categories, expenditures in internal medicine, clinical biology and radiology split by type of services). Thus, the analyses can be carried out either by APDRG or by APR-DRG, which will allow a comparative study of the two systems of classification.

The sample does not include all the groups of pathologies; 612 APDRGs are represented on the 619 existing in the whole APDRG classification system, while 1311 APR-DRG cells are represented on the 1422 cells that the APR-DRG classification system theoretically includes.

Outliers have been calculated for each expenditure item analysed in the present study. The concept of outlier is a significant concept throughout the whole research. An outlier in pharmacy is a stay for which the expenditure in pharmacy is abnormally small or abnormally large compared to the other stays belonging to the same cell (APDRG or APR-DRG*rsv). Consequently, for each expenditure item studied, we will distinguish three categories of stays:

- small outliers: a stay is considered as small outlier for a type of expenditure when the expenditure which is associated to it is lower or equal to a borne LIMINF defined for each group of pathologies (APDRG or APR-DRG*severity index) by the following relation:

$$\boxed{LIMINF = Q1*(Q1/Q3)^2}$$

- large outliers: a stay is considered as large outlier for a type of expenditure when the expenditure which is associated to it is higher than a borne LIMSUP defined for each group of pathologies (APDRG or APR-DRG* severity index) by the following relation:

$$\boxed{LIMSUP = Q3 + 2*(q3-q1)}$$

In both definitions, Q1 is the first quartile of the distribution of the expenditure within the group of pathology and Q3 is the third quartile of this distribution.

- stays known as normal.

The definition of these categories of stays will be valid for all the types of expenditure and within the two systems of classification (APDRG or APR-DRG).

2.2 Prospective financing of drugs expenditure

2.2.1 Introduction

A prospective financing system cannot be set up only on an historical basis; such a system would have negative side-effects as encouraging high and eventually unnecessary expenditure. This is why budgets must be fixed so that hospitals can guarantee the quality of health cares while aiming at more efficiency.

The determination of prospective budgets will be based on the classification of stays within groups of pathologies or DRGs (Diagnosis Related Groups). Two competing systems of classification were at our disposal: the APDRG system (All Patients Diagnosis Related Groups) and the APR-DRG system (All Patients Refined Diagnosis Related Groups).

2.2.2 Validation of the APR-DRG*rsv system

The first step of this study consisted in establishing the superiority of the APR-DRG classification system compared to the APDRG classification system as explanatory variable in order to explain the variation of expenditure of pharmacy, and as reference tool for a prospective financing based on pathologies.

The best performances of system APR-DRG could be observed on several levels:

- in terms of outliers: the APR-DRG*rsv system standardises the distribution of drugs expenditure by increasing the proportion of normal cases to the detriment of the two other categories, both in terms of frequencies and in terms of amounts. The fact that the APR-DRG system takes specifically into account the severity of cases makes it possible to improve the homogeneity within the cells.

- in terms of explained variance; the APR-DRG*severity index system improves the percentage of variance explained for drugs expenditure (56,1 % of explained variance, against 51,4% for APDRGs). Drugs expenditure is more homogeneous within the cells in the APR-DRG system, which consequently reveals itself as a better tool for prospective payment.

Though, another problem arises when using the APR-DRG system: the number of « critical cells » increases. Critical cells are cells with a number of cases too weak to allow the calculation of significant means. A prospective financing system requires average expenditures to be calculated for each subgroup of stays (APDRG or APR-DRG*severity index cell); the lump refund will be fixed, if not strictly to this average, at least in reference to it. Consequently, it is important to have enough stays per cell

in order to make sure that the averages are significant. For this reason, as the APR-DRG system operates a finer classification of stays, it includes a greater number of cells with very small frequencies (7,7% of the cells, against 1,3% for APDRGs). This problem will have to be taken into when elaborating a prospective model.

One could observe nevertheless that with an identical structure of pathologies and on identical level of severity (as measured by APR-DRGs), the expenditure observed in the teaching hospitals was systematically higher. It would be useful to be able to analyse further this difference and to figure out to what extend it can be explained by an insufficient taking into account of severity by the APR-DRG system, the intensity of treatments or the inefficiency in the use of the resources.

It seems however impossible to attribute all this difference with the taking into account of the severity of the cases since the variations of expenditure are also found for the lower severity indexes.

2.2.3 General characteristics of the prospective models for drugs expenditure

The study exposes two prospective models. Both models have been built according to the following criteria:

- Use of the APRDRG classification system

- Specific financing methods for the large outliers

- Fixing of ceilings to the expenditure per stay in order to limit the financial risk for the hospital

- Setting up of an « exclusion » list: some rare, very expensive drugs or some drugs whose consumption is very variable within the same APR-DRG should be financed apart from the prospective model in order to avoid the rejection of patients using these drugs.

- Setting up of separate budgets for the financing of new drugs in order not to discourage technical progress.

- Progressive implementation of the prospective model, in order to allow the hospitals to adapt their practices without attempting to the quality of cares.

2.2.4 Simplified prospective model

The simplified prospective model is based on the standardisation of drugs expenditure by APR-DRG*rsv cell, so that the differences in stays treated by the hospitals, in terms of pathologies or in terms of severity, can be taken into account. The expenditure related to drugs belonging to the exclusion list was removed from the total drug expenditure.

The standardised expenditure is calculated in two steps:

- An average drug expenditure is calculated for each APRDRG*rsv cell. For this calculation, only normal stays are taken into account; the outliers are

removed from the sample. The standardised expenditure associated to a stay is the average of the cell to which it belongs.

- The hospital's total standardised expenditure is the sum of the standardised expenditure associated to each of its stays.

- This standardised expenditure is then compared with the actual expenditure as observed in each hospital. It is then possible to assess whether the hospital has drugs expenditure higher or lower than the national average considering its structure of pathologies.

This simplified model also makes it possible to make comparisons between hospitals and to put forward factors that can influence drugs expenditure. For instance, it is observed that the hospitals belonging to the subgroup of teaching hospitals have systematically higher drug expenditure than the national average.

2.2.5 Co-responsibility model (between the hospital and INAMI)

2.2.5.1 Description of the model

The co-responsibility model is an original contribution of this study. It is in fact a mathematical formalisation of prospective refund mechanism including several variables of decision (such as the rate of marginal refunding, the drugs excluded from the prospective payment system, ceilings of expenditure...). As in the simplified model, the refunding of drugs expenditure is calculated by APRDRG*rsv cell and takes into account a list of drugs which are excluded from the prospective payment system. The normal cases (i.e. non-outliers) are at the average expenditure inside the APR-DRG*rsv to which they belong; this average is calculated only on the normal cases.

The large outliers, as defined in section 2.1, are subjected to specific refunding procedures. Moreover, the model defines a fourth category of stays, called stays "above ceilings" and characterised by exceptionally high expenditure (the values of the ceilings are fixed at 1000 KFB for bone marrow and liver transplants, 600 KFB for other transplants and 400 KFB for all the other groups of pathologies). The co-responsibility model is illustrated by the following graph:

Figures 1.1.1 *r_c as a fonction of x_c*
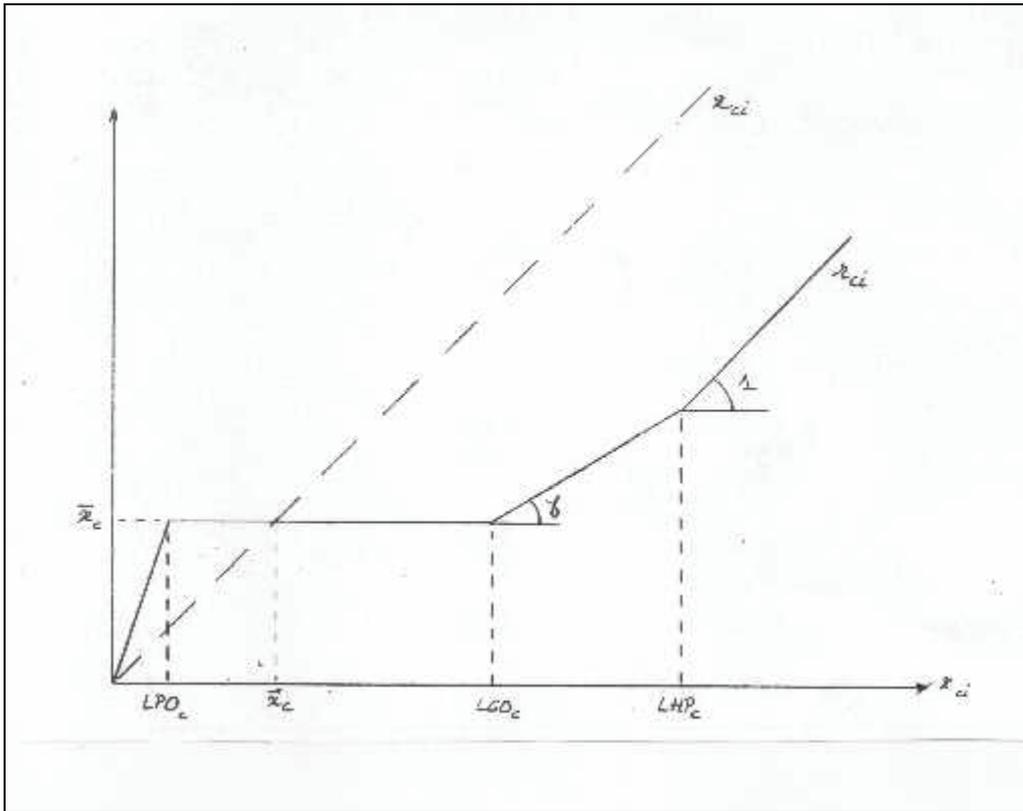
On this chart, the X-coordinates axis represents the drug expenditure related to any given stay L. The ordinate axis represents the refunded amounts. The bisectrix (into dotted) corresponds to a theoretical situation in which the refunding is entirely based on a fee-for-service model.

The figure in continuous line illustrates the relation between the refunding r_c and expenditure x_c associated to a given stay C, the latter being characterised by a given APR-DRG and a given severity index. Four remarkable points are represented on the expenditure axis:

- the LPO_c point corresponds to the lower outlier limit for the APR-DRG*rsv cell to which the stay C belongs.

- the point $\bar{x}_c$ corresponds to the average expenditure for the normal cases (i.e. non-outliers) within the APR-DRG*rsv cell to which the stay C belongs.

- the LGO_c point corresponds to the higher outlier limit for the APR-DRG*rsv cell to which the stay C belongs.

- the LHP_c point corresponds to the limit of « above ceiling » expenditure.

In the co-responsibility, the refunding can be calculated the following way:

- If the drugs expenditure associated to a given stay is lower than the national average $\vec{x}_c$, the hospital gains an amount equal to the difference between the average and the amount that was actually spent.

- If the drug expenditure associated to a given stay is contained between $\vec{x}_c$ and LGO_c, the expenditure is only refunded up to $\vec{x}_c$; the hospital must support a part of the expenditure equal to LGO_c-$\vec{x}_c$.

- If the drugs expenditure associated to a given stay lies between LGO_c and LHP_c, the expenditure is refunded up to $\vec{x}_c$ plus a fraction γ of the actual expenditure for the part exceeding the higher outlier limit LGO_c (with γ ranging between 0 and 1).

- If the drugs expenditure associated to a stay is higher than the LHP_c ceiling, the part exceeding the ceiling is completely refunded (γ =1).

The model also allows a progressive shift from a fee-for-service system to a fully prospective system so that hospitals can adapt their behaviour to the new system; a π coefficient is introduced into the model so that the refunding which is actually received by the hospital for a stay h is equal to $F_h = \pi r_h + [1-\pi]x_h$ (with π ranging between 0 and 1).

Four variables of decision are thus included in the co-responsibility model:

- the γ coefficient, which corresponds to the rate of refunding for expenditures beyond the higher outlier limit ; it has been fixed at 0.8 for the reference simulation

- the π coefficient of progressiveness, that allows to trade off between fee-for service system and prospective system ; it has been fixed to 0.5 in the reference simulation

- the limits of « above ceiling » expenditures

- the taking into account of an « exclusion list », which lists some rare and expensive drugs that shouldn't be financed on a prospective basis.

2.2.5.2 Results of simulations

Several alternatives of the model were tested in order to assess the impact of each variable of decision on the financial situation of the hospitals.

By increasing the coefficient of progressiveness π, one can soften the impact of the co-responsibility policy on the hospitals and allow a smooth passage towards a prospective refunding system.

By increasing the value of the coefficient of marginal refunding for the outliers γ, one can also attenuate the impact of the prospective system on the finances of the hospitals, although this impact is less important.

More generally, various simulations revealed that, for the same severity index, the average expenditure by stay was systematically higher in teaching hospitals than in general hospitals. Teaching hospitals are even more penalised when the « exclusion list » is removed; this observation suggests that the « exclusion list » is, as well as the severity index, a good way of modulating the system of co-responsibility so that the specialised services are not systematically penalised for they often deal with the most severe cases.

2.2.6 Conclusion

The results discussed above could lead to some guidelines. If a part of the differences between the observed and the standardised expenditure can be explained by the fact that the APR-DRG system does not take into account all the severity of the cases, the pharmaceutical expenditure seems however slightly higher in teaching hospitals even for the lowest levels of severity.

An efficient prospective system should be able not to penalise teaching hospitals if their higher expenditure are due to more severe cases but to encourage them to be more efficient on a given severity index.

In addition, it has been shown that some services in general hospitals are more specialised than their university counterparts. As the specificity of teaching hospitals doesn't seem to be fully measured by the APR-DRG, a first track for further useful development of the models developed in this chapter would consist in introducing in them a variable measuring the degree of specialisation of services so that the prospective financing would not penalise the most specialised units.

2.3 Prospective refunding of the expenditure of clinical biology

2.3.1 Introduction

This chapter is devoted to the prospective refunding of expenditure related to clinical biology; it will follow the same structure as that devoted to drugs expenditure. We should point out however that the current refunding system for clinical biology is partially prospective. The first part of our analysis will focus on an evaluation of the current system; we will then carry out a comparison with our co-responsibility model in terms of impact on the hospital's financial situation.

2.3.2 Validation of the APR-DRG system

As for the drug expenditure, the setting up of budgets of clinical biology will be carried out on the basis of a classification of stays according to the APR-DRG system as it as been described in point 2.2.1.

The APR-DRG system appeared to be a better classification tool at various levels:

- in terms of outliers: the APR-DRG system standardises the distribution of expenditure by increasing the proportion of normal cases and reducing the proportion of large outliers; the latter account for 1,5% of the frequency and 3,5% of the expenditure of clinical biology in the APR-DRG system, versus 1,8% of the frequency and 5,2% of the expenditure of clinical biology in the APDRG system. The APR-DRGs reinforce the homogeneity within the cells; this is probably due to a best coding of the severity of cases.

- in terms of explained variance; the APR-DRG system improves the percentage of variance explained for clinical biology expenditure (55,2 % of explained variance, against 50,4% for APDRGs). The clinical biology expenditure is more homogeneous within the APR-DRG*rsv cells, which consequently constitute a better tool for the prospective refunding system.

As for drugs expenditure, it appears that the average expenditure by stay is systematically and appreciably higher for the teaching hospitals compared to the general hospitals; this can be observed for any level of severity index, as much for the medical as for the surgical cases. Moreover, the variations increase with the level of severity.

These variations could be explained by the fact that the teaching hospitals are more often equipped with the very specialised services, which treat the most serious and thus most expensive, cases. For the highest levels of severity (rsv 3 and 4), the systematic difference in the cost of the stays treated by various hospitals could thus be related (at least partly) to the more or less specialised character of the latter. On

the other hand, the rather significant differences between general and university hospitals are more difficult to understand for the lower levels of severity.

2.3.3 Analysis of the impact of a prospective refunding policy

2.3.3.1 Analysis of the impact of a prospective refunding policy based on INAMI codes

As they didn't have RCMs to be able to describe the structure of pathologies in terms of APR-DRGs, the INAMI initially tried to approach the structure of pathologies through INAMI « codes of surgical operations ». That policy envisaged a refunding of the expenditure of clinical biology according to a sum of two terms, the first being a fraction of the actual expenditure of the hospital and the second a contractual part. The contractual part relayed on an approximation of surgical pathologies based on the INAMI codes. Formally, the refunding due to the hospital H was equal to

$$F_h = \alpha\, X_h + R_h$$

where X_h represents the actual expenditure of the hospital H, R_h represents the part that is refunded on a contractual basis and α the marginal rate of refunding. This rate was set up at 25%.

2.3.3.2 Comparison between the impact of a prospective policy based on the APR-DRG classification vs a prospective policy based on INAMI codes

If one compares the impact of a prospective refunding policy based on APR-DRGs with that of a prospective refunding policy based on INAMI codes, one notes that the impacts strongly differ.

For 70 hospitals out of 77, refunding would be less favourable, while 50 % of the hospitals would perceive more than 30% less. On the other hand, among the 7 hospitals that would benefit, the fixed refunding would be practically doubled. This shows us that the approximation of pathologies via INAMI codes does not allow to approach pathologies in order to carry out an equitable division of resources between the hospitals and that it was urgent to shift towards a fixed refunding using the APR-DRGs instead. In 1997, if one compares the refunding that the hospital would have received if one had continued to refund them on a fee-for-service basis and the refunding that they actually received on basis of a partially prospective system (25% of the actual expenditures + contractual refunding), one observes that more than 80% realise a bonus following the prospective policy. The four teaching hospitals are among these 80% of « winning » hospitals.

Moreover, for more than 50% of the hospitals, the refunding increases by more than 30%; for some of them it even increases by 90%. Those figures suggest that the prospective policy encouraged the hospitals to consume less services of clinical biology, which was the goal aimed by the reform in a context of strong overconsumption.

2.4 Prospective refunding of the expenditure of radiology

2.4.1 Characteristics of the distribution of the expenditure of radiology

The distribution of radiology expenditure differs from that of drugs or clinical biology expenditure by its significant proportion of stays for which the expenditure is null (29,15% of the stays). This observation has significant implications in terms of outliers. Indeed, 29,7% of the total number of the stays of the database should be considered as small outliers and consequently be excluded for the calculation of standardised averages. Within certain APR-DRGs, it even happens that more than 75% of the stays have radiology expenditure equal to zero; consequently, for these APR-DRGs, any stay having non-null radiology expenditure would have to be considered as large outlier.

This particularity led us to adapt the model that was previously described:

- at first, it seemed more appropriate to keep the "small outliers" in the sample when calculating the national standardised averages, so that the results are still representative of the actual distribution and so that we limit the risk of overestimating the standardised amounts

- moreover, about the APR-DRGs for which more than 75% of the stays had no radiology, the homogeneity of this phenomenon within the various hospitals should be tested before considering any stay with non-null expenditure in such cells as great outliers.

2.4.2 Validation of the APR-DG system

As for drug expenditure, the determination of the budgets of pharmacy will be carried according to a classification of stays through the APR-DRG system, as described in point 2.2.1. The study showed that the APR-DRG system was a better classification tool than the APDRG system for the setting up of budgets of radiology; in particular, it improves the percentage of explained variance for the radiology expenditure (48,66 % of explained variance, versus 45,18% for the APDRGs). The radiology expenditure is more homogeneous within the cells of the system APR-DRG, which consequently is a better tool for prospective refunding.

It also appeared that the results were better the more the explained variable was aggregated; the prospective refunding system would be more efficient if it relays on a standardisation of total expenditure rather than a standardisation by type of services, insofar as the total radiology expenditure is much more stable within the groups of pathologies than separated amounts related to specific services. Moreover, a prospective financing of the total expenditure allows more room for manoeuvre for the financial administrator and leads to less administrative red tape.

2.4.3 Presentation of the models

Once assumed the superiority of the APR-DRG system as classification tool, we still have to define the characteristics of the prospective model itself, considering that a specific treatment should be applied to the outliers. The same options exists as for drugs expenditure:
- the first one is a simple model of standardisation, which compares for all the stays of an hospital (excluding large outliers) the

standardised expenditure and the real expenditure for radiology and then calculates a standardisation differential; this differential will then be applied as corrective factor to the total radiology expenditure, including the large outliers. If a hospital spends more than the national average, it is penalised.

- the second one is a more complex model of co-responsibility, with a refunding varying according to the extend of the expenditure (progressive refunding of the large outliers). That model would have the same characteristics as the model discussed in point 2.2.5.1.

3 Second part : Evaluation of two actual measures suggested by the Ministry for the Social Affairs

3.1 Montants de référence (« Referential amounts »)

3.1.1 Introduction

In his note on general policy from January 29, 2002, the Minister Vandenbroucke presented his Agenda 2002 for the change in health care management. Item 2.5 of this document introduced the concept of « Montants de Référence » (*« Referential Amounts »*) for a certain number of so-called « routine » pathologies. That proposal aimed at a more prospective financing of some frequent, homogeneous in terms of costs and simple in terms of procedures pathologies, for which one can easily spot consumption profiles significantly deviating from a national average. These pathologies were referred to as « Traitements de routine » («*Routine Treatments »*). These 28 routine treatments are distributed within 26 APR-DRGs. Only the stays corresponding to the severity indexes 1 and 2 are concerned with this project.

3.1.2 Definition of the 28 routine treatments

The following table shows the 15 groups of surgical pathologies and the 13 groups of medical pathologies concerned with the project of prospective financing.

Surgical		Medical	
APR-DRG	*Description*	*APR-DRG*	*Description*
73	Lens procedures w or W/o vitrectomy	45	CVA W Infarct
97	Tonsillectomy & adenoidectomy procedures	46	Nonspecific Cva & Precerebral Occlusion W/o Infarct
179	Vein ligation & stripping	47	Transient Ischemia
225	Appendectomy	134	Pulmonary Embolism
228	Inguinal & Femoral Hernia Procedures	136	Respiratory Malignancy
263	Laparoscopic cholecystectomy	139	Simple Pneumonia
302a	*Code INAMI 289085*	190	Circulatory Disorders W Ami
302b	*Code INAMI 290086*	202	Angina Pectoris
313	Knee & Lower Leg Procedures Except Foot (*Code INAMI 300344*)	204	Syncope & Collapse
318	Removal of internal fixation device	244	Diverticulitis & Diverticulosis
482	Transurethral prostatectomy	464	Urinary Stones W Esw Lithotripsy
513a	*Code INAMI 431281*	465	Urinary Stones W/o Esw Lithotripsy
513b	*Code INAMI 431325*	560	Vaginal delivery
516	Laparoscopy & tubal interruption		
540	Cesarean delivery		

3.1.3 Methods of calculation

For each of the 28 reference groups, one determines a referential amount by class of severity (levels 1 and 2) and by expenditure (clinical biology, medical imagery and internal medicine). This amount corresponds to the national average consumption by patient, calculated after exclusion of the large outliers and raised of 10%.

One will exclude the large outliers in radiology for calculation of the referential amounts of radiology, the large outliers in clinical biology for the calculation of the referential amounts in clinical biology and the outliers in internal medicine for the calculation of the referential amounts in internal medicine.

The small outliers are thus kept in the sample for these calculations. This choice can be justified by the high proportion of stays for which certain expenditures are often null (in particular the expenditure of radiology and clinical biology); these stays cannot thus be regarded as true outliers insofar as they represent a significant proportion of the sample. On the whole, the system will include 168 referential amounts (28 groups of pathologies X 2 levels of severity X 3 expenditures).

It thus appears that the forfaitarisation will relate separately on each expenditure and not to the aggregate expenditure.

For this part of the study, we worked on a database including 1.386.025 stays distributed over the two years 1996 and 1997. The subset of the database concerning the 28 reference pathologies and the 2 selected levels of severity includes 314.938 stays, subdivided in 155.547 medical stays (49,39%) and 159.931 surgical stays (50,61%). 72,58% of the stays were of severity 1 and 27,42% of severity 2.

On the whole, these 28 groups of pathologies (and two levels of severity) thus concentrate 22,7% of all the stays, corresponding to 12,3% of the radiology expenditure, 14,3% of the expenditure of clinical biology and 12,1% of the expenditure of internal medicine.

3.1.4 Restrictions of the model

In this section, we carried out a simulation by calculating referential amounts on our database. A few remarks can be made:

1. Exclusion of many stays

By excluding the cases from severity 3 and 4, the system of the referential amounts eliminates 8,29% of the stays relating to the 28 reference groups; these eliminated stays account for 21,29% of the total amount of radiology, clinical biology and internal medicine relating to the 28 groups aimed by the project. These amounts, relatively significant, thus escape the prospective financing system, what could be an incentive to overcoding severity indexes, given that the stays of severity 3 and 4 would remain for the moment refunded on a fee-for-service basis.

2. Choice of the groups of pathologies

We carried out studies of variance successively on all the stays and on the subset of stays limited to the 28 reference groups, by taking as explained variables the expenditure of radiology, the expenditure of clinical biology, the expenditure of internal medicine and the aggregate expenditure (radiology + clinical biology + internal medicine). The results showed that the explanatory power of the APR-DRG system was definitely better when the aggregate expenditure is taken as explained variable. This observation speaks in favour of a prospective refunding system applying to the global aggregate expenditure rather than to expenditures taken separately.

The results also showed that the percentages of variance were much higher when calculated on the whole database instead of the subset related to the 28 reference categories. One can consequently wonder about the relevance of restricting the project to those 28 reference groups.

3. Lack of positive incentive

In the prospective system as it has been described, there is no positive incentive for the hospital. Indeed, if a hospital spends more than the referential amount for a given reference group of pathologies, it is penalised and has to support the difference. On the other hand, if it spends less than the referential amount, it is not rewarded.

Moreover, there is no compensation between the 28 reference groups; the hospital is penalised for *each* reference group where it spends more than the referential amount. The only compensations that are allowed by the system are compensations between two severity index inside the same reference group.

3.1.5 Simulations and standardisations for the pathology and the severity index

We also carried out a simulation of calculation of the referential amounts on our database. This simulation allowed us to calculate, for each one of the 56 reference cells and for each type of expenditure, a standardised amount, equal to the national average after exclusion of the large outliers. These national averages allowed us to carry out standardisations by comparing them with the averages observed within each hospital and then to measure the impact of the prospective model on the actual budget of the hospitals.

Standardisations made it possible to highlight a strong dispersion of the averages by hospital around the national average even when we take into account their structure of pathologies. The deviations from national average range from –47,61 % to 46,77 % for radiology, from –68,01 % to 127,97 % for clinical biology and from –56,83 % to 57,53 % for internal medicine. The teaching hospitals have systematically a higher expenditure than the general hospitals; it is worth pointing out however that the 28 groups of pathologies represent a smaller part of their budget.

The large range of variations can be interpreted as an indicator of the need to establish guidelines inside the groups of pathologies.

3.2 Prospective refunding of 7 drugs categories

3.2.1 Introduction

This section of the study aims at evaluating the impact of the project of partial prospective financing of drugs pharmaceutical expenditure proposed by the Minister for the Social Affairs.

The Arrêté Royal of October 18, 2002, sets up a prospective refunding for 7 main categories of drugs, corresponding to 7 ATC categories (Anatomical Therapeutical Chemical classification system):

- the category A02 (anti-acid, anti-flatulent and anti-ulcerous),
- the category B01 (anti-thrombotics),
- the category B05 (substitutes of blood and solutions of perfusion),
- the category J01 (anti-bacterials of systemic use, antibiotics),
- the category M03 (muscle relaxants),
- the category N01 (anaesthetics),
- the category N02 (analgesics).

The project is based on the APR-DRG classification and is restricted to the surgical stays (outliers excluded), apart from those relating to transplantations, tracheotomies and certain percutaneous cardiovascular procedures (APR-DRGs 174 and 175).

The outliers are calculated on the distribution of the total drug expenditure (all categories of drugs together). 75% of the expenditure for antibiotics will be refunded on a prospective basis; this rate is fixed to 50% for the 6 other categories aimed by the project.

For each APR-DRG*severity index cell retained by the project, one calculates the national average expenditure for each of the 7 categories of drugs, after exclusion of the large outliers. One determines what is called the *relative weight* of the cell (APR-DRG and severity) by summing up 75% of the average expenditure for antibiotics and 50% of the average expenditure for each of the 6 other categories of drugs.

This relative weight determines, for a stay belonging to a given cell, the portion of the drug expenditure that will be refunded on a contractual basis. The remaining balance will still be refunded on a fee-for-service basis.

The relative weights are then summed up within each hospital to constitute its individual budget. These budgets are then adjusted in order not to exceed the total budget that is annually allocated to the prospective refunding of drug expenditures.

The database we used for this part of the study dates from 1997 and is made of 647,283 stays (outliers included). These stays are distributed in 61 hospitals, among which 4 teaching hospitals and 57 general hospitals.

3.2.2 Importance of the 7 concerned categories

The 7 categories of drugs account for 50,69% of the total drug expenditure on the medical stays and 56,04% of the total drug expenditure on the surgical stays.

After exclusion of the medical stays, the outliers and the surgical APR-DRGs explicitly excluded from the prospective refunding system, only 33,81% of the expenditure relating to the 7 categories are aimed by the project; these stays account for 18% of the total drugs expenditure, all stays and all categories of drugs taken into account.

Let us note that for 99,73 % of the stays concerned by the project, at least one drug belonging to the 7 categories is prescribed.

3.2.3 Critical analysis of the system

3.2.3.1 Financing the outliers

The outliers account for 31,99% of the expenditure related to the 7 drugs categories, distributed on 7,43% of the stays. However, the system suggested by the Ministry for the Social Affairs suggests a full refunding of the outliers. Let us recall that the normal cases are financed to the amount of the relative weight. That means that if a stay spends more than its relative weight but is not a large outlier, the hospital will have to support the part of the expenditure exceeding the relative weight. Consequently, it is in the hospital's interest to increase drugs expenditure for the cases that are almost outliers so that they become outliers. Seen from that point of view and for these stays with high drug expenditure, the system has a negative incentive effect on the search for more efficiency.

3.2.3.2 Selection of the drugs categories and of the stays

The studies of variance showed that the APR-DRG system explained 54,67% of the variance of drug expenditure relating to the 7 selected categories among the selected stays, though it explained 60,07% of the variance of the total drug expenditure. One can wonder about the relevance of restricting the prospective refunding system to these 7 drug categories rather than applying it to the whole pharmaceutical expenditure.

Moreover, this percentage of explained variance is still improved (from 60,07% to 60,87%) when all the stays are included in the analysis, all APR-DRGs surgical and medical joined together. The precision of the budgets would undoubtedly have been better if we apply the prospective system on all the pharmaceutical expenditure all the stays.

3.2.3.3 Dealing with cells with small number of stays

Theoretically, the prospective refunding of drugs expenditure applied to 546 APR-DRG*rsv cells, distributed in 144 APR-DRGs. In our database however, many of these cells included less than 20 stays and some of them were even empty, what poses a problem for the calculation of the national average. In order to face this problem, the Arrêté Royal envisages precise rules to regroup contiguous cells in order to dispose of sufficiently large frequencies. Simulation showed that these rules didn't really solve the problem for many cells remained problematic even after the regroupings.

Moreover, the fact of grouping several levels of severity sometimes lead to paradoxical results, such as for example an over-estimated average of the unsevere cases to the detriment of the more severe cases. These imbalances compensate each other on the whole sample but not necessarily within each hospital. Thus, a hospital could be refunded several times its real expenditure for a stay of severity 1 while another hospital could be only refunded up to a small fraction of its real expenditure for a stay of severity 4.

3.2.4 Standardisations for the pathology and the severity index

In this part of the study, we standardised the expenditure in each of the 7 categories for the APR-DRG crossed with the severity index.

It appears that there is a great variability of the average expenditure per hospital compared to the national average expenditure. The most important deviations can be observed for anaesthetics (from –86,94 % to 75,82 %) and analgesics (from -78,17 % to 74,40 %).

The study showed that the shift toward a prospective payment system tend to have a variable impact on the hospital's budget for drugs; one hospital would loose 2,47 % of his total budget for drugs while another one would earn 4,33 % more if the system is applied according to our simulation. The expenditure related to antibiotics count for the biggest part of the variation.

4   Conclusion

In the first section of this research, we developed a series of theoretical models of prospective refunding of the expenditure related to inpatients drugs, radiology, clinical biology and internal medicine. This section allowed us to carry out several simulations and to extract several recommendations from it. A framework of theoretical reflection was thus defined in order to help a critical discussion on concrete measures. It appeared to us that a prospective system was more effective when it applied to global amounts rather than to partial expenditures.

Meanwhile, the government set up two concrete measures (referential amounts, prospective refunding of 7 drugs categories) going in the direction of a more prospective financing of the health expenditure. However it appeared to us that some aspects of these measures could be criticised on the basis of the conclusions drawn in the first part of our study.

In particular, one can wonder about the lack of positive incentives accompanying the measures.

Moreover, another problem is the extremely local character of their sphere of application. We think that the prospective system will earn in efficiency if it is thought more globally in the future.