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The Diagnosis Related Groups (DRGs) to Adjust Payment-Mechanisms for Health System Providers*

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The Diagnosis Related Groups (DRGs) to Adjust Payment-Mechanisms for Health System Providers*

I Introduction

In a health system different payment-mechanisms to reimburse providers (physicians and hospitals) can coexist. A payment-mechanism is a contract among patients, providers, and payers to provide health services. Modifications in payment mechanisms can be used as a base to introduce health reforms aimed (for instance) at improving hospital management and quality, separating the functions of financing and provision of health services, decentralizing, and increasing coverage levels. This topic is one of the most important aspects in health care financing: if the incentives of the parts involved are adequate, efficiency and equity may be promoted within the system. A central aspect is that any payment-mechanism is in need of solid information to understand financial and hospital activities of health systems.

The main objectives of this document are: explain what are DRGs, analyze their use as a payment-mechanism, and identify the variations that arise when developing DRGs systems across countries. DRGs are classification systems that group patients into categories that show the use of homogeneous hospital resources and the cost of services. They were originally developed in the United States in the seventies to identify variations in medical practices and hospital utilization, as well as to identify clinical differences in groups of patients. They were subsequently used in some countries (Australia and Canada, and in some European and Asian countries) to adjust the mechanisms of payment to hospitals. This topic is of interest for social security agencies because it pays hospitals in a number of Latin American countries.

This document is part of the CISS' research project "The Emerging Paradigm in Health Systems; Achieving and Preserving Universal Entitlement in the Nations of the Americas". Among the main results, the document identifies great variations in the DRGs systems in the different countries that have implemented these classification methods. The differences depend on each country's health system structure, the payment methods that are used, the availability of information and the level of collection—and representativeness—of the data. The document is organized as follows: Section two explains what are DRGs and how these systems can be classified according to the population that receives care and the characteristics of the grouped information. Section three reviews the definition of payment-mechanisms and the incentives these can have on the behavior of health care providers. Section four presents a basic guide for the implementation of DRGs systems. Section V analyzes the characteristics of DRGs in different countries (United States, Canada, Europe, Latin America and Eastern Europe). The last section presents the conclusions.

II. What are DRGs?

Diagnosis Related Groups (DRGs) are classification systems that group patients according to the consumption of resources required for their treatment and their clinical characteristics. Originally, DRGs were developed for inpatients, but they have evolved and now they are also used for ambulatory and long term care. Physicians are in charge of classifying patients, assigning a DRG to each admission.

These classification systems were developed in the United States in the seventies at Yale University – with a cooperation agreement with the Health Care Financing Administration (HCFA), which managed the Medicare program that financed health services for the retired (by any cause, disability or old-age) with a payroll tax. These early DRGs were developed initially as a tool to administrate costs and to help hospitals and clinics to monitor utilization and quality of the services provided. The use of DRGs as an instrument for cost containment for hospitals started in 1983, when Medicare began to use them as the base of a Prospective Payment System (PPS) that pays a fixed amount for each patient that receives care.

Figure 1 shows the different uses of DRGs since their appearance. In the first stage, a minimum basic data set is generated to classify the patients and their diseases. In the second stage, when DRGs in the health system are homogeneous, it is possible to use them to make comparisons of hospital performance within the system. In the third stage, if the functions of financing and provision are separated in a health system, DRGs can be a tool to adjust the methods of payment (reimbursement) to hospitals. It is important to note that in Latin America, as well as in other places in the world, there are countries that do not have the minimum basic data of hospital activity.

Five variables are primarily used to define a DRG: diagnosis code¹ (principal and secondary; complications and comorbidities can be included),² procedure code (surgical or non surgical; as well as the requirement of personnel with specialized training or special facilities), age (in years or months for the newborn), sex, and the discharge status of the patient (how the patient was released from the hospital and destiny; for example, transfer to other hospital, home-based care, short term hospitalization, death, etc). Although classifications change frequently due to technological improvements, the use of new drugs, or the appearance of new diseases, the logic to construct the different versions of DRGs is the same.³

¹ The diagnoses refer to the main cause of the patient's hospitalization. However, it is important to note that in Canada, the definition of diagnosis refers to the condition that caused the highest cost.

² The codes accepted by the WHO that are generally used are the ICD10-CM and ICD9-CM (International Committee on Diseases, version 10/9, Clinical Modifications).

³ The logic to construct a DRG has not changed since its beginnings, but as it has evolved some exceptions have been identified, as occurs with HIV/AIDS patients with.

Figure 1. Use of DRGs by Stages

•Classification system of patients	•Hospital Benchmarking	•Payment mechanism
<p>- Objective</p> <ul style="list-style-type: none"> - Classification of diseases according to clinical complexity and utilization of resources 	<ul style="list-style-type: none"> -Identification and comparison of better practices in hospitals 	<ul style="list-style-type: none"> - Use DRG as prospective payment mechanism to hospitals
<p>- Requiriments</p> <ul style="list-style-type: none"> - Minimal set of basic data - Coding of diagnoses and procedures 	<ul style="list-style-type: none"> -Database with information of each hospital within the health system 	<ul style="list-style-type: none"> - Hospital information - Financial information

Source: Own elaboration

II.1 Types of DRGs

The DRGs that were originally developed in the United States, which have been implemented throughout the world in different versions, have been going through a process of evolution for the last 20 years; these can be grouped in five main classes: Medicare DRGs, Refined DRGs, Severity DRGs, All Patient DRGs, and All Patient Refined DRGs. The classification of Refined DRGs includes differences in age, complications and morbidities that cause increases in costs. The Severity DRGs (S/SR-DRGs) that appeared in 1994 include a re-evaluation in the use of complications and co-morbidities. The all patient DRGs (AP-DRGs) include the population that does not belong to Medicare, as well as the Pediatric Diagnostic Related Groups and the Major Diagnostic Category 24 for patients infected with HIV. In the All Patient Refined DRGs (APR-DRGs) the classification describes the severity of the patients' illness. This refinement turned out to be a substantial change in the logic of grouping. All ages, complications' distinctions and co-morbidities were removed and replaced by two groups, one to describe the severity of the illness, and the other to represent the risk of mortality.

There are also Adjusted Clinical Groups (ACGs), which were developed at the John Hopkins University. The ACGs assign persons to unique, mutually exclusive morbidity categories based on patterns of disease and expected resource requirements. ACGs can be used as an alternative to traditional age/sex categories when trying to take into account variations in morbidity between two or more populations of patients. On the other hand, the University of Boston has proposed the Diagnostic Cost Groups (DCGs). The DCGs create clinical profiles that can be used to measure health status and to predict the use of resources at the individual and group levels. Another classification that incorporates risk groups is the Clinical Risk Groups (CRGs). The CRGs follow a categorical clinical model that classifies the individuals in mutually excluding risk categories--using affiliation data, claims or other data--and assigns each person to a severity level when the patient has a chronic health condition.

International DRGs arised as an answer to classification needs of patients in other countries. The 3M Company constructed the international system using the same logic and structure of the All Patients DRG in the United States. This new system provides the same results in the classification of patients, independently of the coding system used. An adjustment for severity was included using the secondary diagnosis, and some DRGs that were eliminated from the United States' version were added. Some DRGs systems are designed independently in each country.

Another special variations of the DRGs classification systems are the systems directed to outpatients and patients requiring long term care. In the Ambulatory Patients Groups (APGs) the procedures in an ambulatory environment can be classified in one of the following groups: i) Significant procedures, usually programmed and constituted as the main reason of the visit; they consume most of the time and resources, ii) complementary tests and procedures, which are ordered by the doctor to make a more accurate diagnosis of the patient, and iii) incidental procedures, which are an integral part of the medical visit. The Long Term DRGs are based on a main diagnosis, several additional diagnoses (secondary), and some procedures developed during the care. Long term care hospitals are dedicated to treat patients who require long stays, with access to technologically advanced therapies.

II.2 Use of Software to Estimate the Costs Associated to DRGs

DRGs are chains of numbers that represent mutually exclusive (in terms of clinical diagnosis and financing) and homogeneous groups. To construct DRGs, software that allows transforming patient information into codes is needed. Nowadays there are many private enterprises that develop these kinds of information systems. Given the extent to which DRGs are used for hospital attention reimbursement in the United States, this and other countries have public or private internet sites that calculate reimbursement using DRGs.⁴ It is important to notice that some international companies that develop and/or distribute this software can also provide training for the people that will be in charge of using it and support to hospitals for encoding diagnoses and procedures.

Example

The internet site of the Department of Defense⁵ of the United States provides the software to calculate reimbursement to hospitals with DRGs. Using this tool, it is possible to obtain information about the length of hospitalization and the costs of attention. See Table 1. The software first processes the minimum set of data to construct a DRG (diagnosis code, procedure code, age, sex, and status of discharge of the patient) and, as a result, it shows columns 2 and 3. Then, the average

⁴ Using local costs.

⁵ The Department of Defense covers workers (and their families) in the Army, Air Force, Navy, Coast Guard, Public Medical Service and Oceanic and Atmospheric Administration

length of stay in the hospital and the cost of attention are calculated for each DRG (columns 4 and 5). In this example the difference between the averaged stays and the amount of reimbursement to hospitals for the same condition (appendectomy) can be observed for different combinations of complications and comorbidities. The appearance or not of a complicated main diagnosis when comorbidities exist (DRG 164 and DRG 166) increases the amount of the reimbursement in more than 3000 dollars.

Table 1. Example of Hospital Costs and Average Length of Stay Using DRG

Specialty	DRG	Description	Average length of stay	Average cost ^{1/}
General surgery	164	Appendectomy with complicated principal diagnosis with complications and co-morbidities.	6.6	\$8,207.31
General surgery	165	Appendectomy with complicated principal diagnosis without complications and co-morbidities.	3.9	\$5,137.48
General surgery	166	Appendectomy without complicated principal diagnosis with complications and co-morbidities.	3.1	\$5,010.00
General surgery	167	Appendectomy without complicated principal diagnosis without complications and co-morbidities.	2.4	\$3,766.04

1/ The data is in dollars for the year 2005.

Source: Own elaboration using the payment calculator available in: www.tricare.osd.mil

III DRGs as a Payment Mechanism

III.1 Definitions and Incentives of Payment Mechanisms

A payment mechanism is a contract among patients, providers, and payers for the provision of a health service. Which are the most usual payment mechanisms? Experience shows that health service provision in the *private sector* commonly uses a reimbursement system for the offered services. In contrast, the *public provision*,—which prevails in Latin America since most health systems are organized and financed in an integrated way—the providers are reimbursed by means of a global budget, based in historical experience (not necessarily in function of the efficiency and quality of the service offered).

A payment mechanism can be defined according to a) *payment unity*, for example: reimbursement by person, case, day, year, service, visit, etc. The payment to the provider can be determined based in a global budget (or per-capita), by disaggregated units, or by an intermediate procedure as the DRGs; b) can be a *prospective or retrospective payment*, depending on the moment where the amount is reimbursed, after or before the expenditure occurs, c) according to the *distribution of the financial risk* that providers and payers take, respectively.

Once the payment mechanism(s) in a health system is(are) established, the distribution of the financial risk is determined and the incentives for the offered services are created. For example, in the prospective payment mechanism the incentives to operate efficiently increase, since the provider takes the risk of the variation in costs. In the retrospective method –based in historical costs—the provider does not bear the risk. In fact, this mechanism gives incentives to increase expenditures by providing more services than the ones required. When there is a third payer, the payment mechanism includes a co-payment for patients affecting, therefore, the patient’s risk.

The challenge of a health system consists on structuring and organizing the services in an efficient way, according to the patients’ needs, and providing the right incentives for both, patients and insurers. The most common payment mechanisms, the incentives that are generated from these, and the underlying distribution of risks are presented in Table 2 (Álvarez, Pellisé and Lobo 2000). The payment mechanisms most commonly used in OCDE countries and in Latin America are explained in Tables 3 and 4, respectively. The answer to what payment mechanism(s) is(are) preferable depends on the organization of the health system in each country.

Not all payment mechanisms require the components of hospital and financing information that the DRGs system provides. Nevertheless, adequate information about the real use of the resources, an accounting system of costs, as well as records of hospital admissions and insurance conditions, are important inputs for the elaboration of health budgets in any country.

Table 2. Description of the Main Payment Mechanisms

Payment mechanisms	Concept	Economic incentives	Risk distribution	Foreseeable effects	Efficiency	Quality	Public action
Payment for medical service	The most disaggregated service is paid	To maximize the number of medical services	Usually on the payer	a) No prevention b) High technology and quality c) Induced demand d) "Corruption" e) Price discrimination f) Inequality	It stimulates activity and the excessive use of resources	+	Maximum prices
Payment by wage	Paid during the working life time	To minimize working effort	a) Pure wage: risks on the provider b) Productivity adjustments: risks on the payer	a) Importance of ascent and promotion b) Larger groups c) Cooperation among physicians	a) It stimulates activity and the excessive use of resources b) Physicians excess-supply	+ -	a) Negotiating weakness b) Quality guarantees c) Design of mixed systems
Per capita payment	Affiliation is paid, the attention to an individual	To maximize the affiliation and to minimize the costs of attention	a) Per capita without adjustments: risk on the provider b) Per capita adjusted: risk on the payer	a) Prevention b) Derivation c) Risk selection	Promotion of the integration of services and prevention when it is efficient	-	Quality control by benchmarking and foster competition
Payment for hospital stay	Payment to the hospital by each patient and each night at the hospital	To maximize the number of hospital stays and minimize the average cost per stay	a) If the payment is not adjusted, the risk of expensive stays is on the provider b) If the tariffs are adjusted with the expected costs, the risk is on the payer	a) It increases the average length of stay b) Minimum costs of stays c) Unnecessary hospital admissions d) No ambulatory surgery	Hospital activity is stimulated	- +	Limits to average stays
Payment for hospital admission	Payment by each inpatient, independently of the length of the stay	To maximize the number of admissions and to minimize the average cost per admission	a) If the payment is not adjusted, the risk of expensive admissions is on the provider b) If the tariffs are adjusted with the expected costs: the risk is on the payer	a) It increases number of admissions b) Reduces the average length of stay c) Re-hospitalizations d) Unnecessary hospitalization	Hospital activity is stimulated	-	a) Penalties for re-hospitalizations b) Exclusion of extreme cases c) Adjust tariffs
Payment by budget	Payment by an activity in a period of time	Minimize costs	If certain features are not considered, is on the provider	a) Expensive implementation b) Planning c) Lender has room to manoeuvre	Efficiency is stimulated, except when there are information asymmetries	-	Great effort is required to avoid inertias

Source: Álvarez, Pellisé and Lobo 2000.

Table 3. Main Payment Mechanism in OECD Countries

Payment mechanism	Ambulatory services	Hospital services
Payment by medical service	<p><i>Germany:</i> the reimbursement method has about 2500 types of services, a valuation scale in points for each one, and a monetary value per point fixed at the end of the period</p> <p><i>Canada:</i> the definition of services varies across provinces. If expenditures exceed the budgeted amount, the difference will be recovered on the next period, by reducing the tariffs</p> <p><i>Denmark:</i> 63% of the earnings for medical services come from fee for service. Tariffs differ according to the type of contact with the patient (at the consulting room, by telephone, at home)</p> <p><i>United States:</i> it is common in private insurers, some HMO and PPO (Preferred Provider Organizations). In Medicare the services include about 6500 positions subdivided in benefits of five digits. The prices are based on a scale that values the time, effort, cost of activities, and the cost assuring malpractice.</p> <p><i>France:</i> the scheme of tariffs is defined according to 4000 medical procedures grouped in alphanumeric codes, a weight for each procedure and monetary multipliers for the alphanumeric codes, which are settled annually</p> <p><i>Holland:</i> Specialized physicians receive a fee for each service, according to a list of diagnoses and procedures, without limit to the total amount paid</p>	<p><i>United States:</i> physicians that work in hospitals bill their patients according to the services offered. In many occasions, prices are not adjusted to pre-established tariffs, but are fixed freely. In Medicare, all hospital categories and external services are paid for service offered</p> <p><i>Finland:</i> Since 1993, hospitals agree with municipalities the amount to be reimbursed for the services offered. One of the types is the billing for services offered based in specific prices by specialty</p> <p>In most of the countries, it is the way to reimburse the private hospital services</p>
Payment by wage	<p><i>Spain:</i> in the reformed model, the main component of the reimbursement to physicians is the adjusted wage according to degree and experience</p> <p><i>United Kingdom:</i> specialized physicians of the National Health Service (NHS)</p> <p><i>Sweden:</i> physicians in the Dala model</p>	<p><i>Germany, Denmark, Spain, France, Holland and United Kingdom:</i> hospital reimbursement to physicians</p>
Per capita payment	<p><i>Denmark:</i> it represents 28% of physicians' revenue</p> <p><i>Spain:</i> it represents 10-25% of physicians' monthly revenues. The capitation payment is weighted by the patient's age and geographic dispersion of the population</p> <p><i>Holland:</i> it is the reimbursement method to general physicians</p> <p><i>United Kingdom:</i> it represents 60% of the revenue of general physicians in NHS</p> <p><i>Sweden:</i> physicians in the Stockholm model</p>	
Payment by hospital stay		<p><i>Germany:</i> the budget is fixed according to a payment per stay. If the stay lasts longer than the number of days expected, reimbursement increases in 25% while they receive only 75% of the accorded if the stay is shorter.</p> <p><i>Spain:</i> the weighted unit (UPA) weights activities according to the resources consumed, and expresses it in terms of average stay</p> <p><i>United States:</i> Diagnostic Related Group (DRG)</p> <p><i>France:</i> Groupes Homogènes de Malades</p>
Payment by hospital admission		<p><i>Sweden:</i> DRG (in Stockholm)</p> <p><i>Canada, Denmark, Spain, France, Holland, United Kingdom and Sweden</i></p>
Budget payment	<p><i>United Kingdom:</i> the GP Fundholders manage their own budgets</p>	

Source: Álvarez, Pellisé and Lobo 2000, and Instituto Mexicano del Seguro Social 2000.

Table 4. Main Payment Mechanism in Latin-American Countries

Payment mechanism	Ambulatory services	Hospital services
Payment by medical service	<p><i>Argentina:</i> it is one of the modalities of contract between the medical associations or clinics and Social Works</p> <p><i>Chile:</i> in the private system of Provident Health Institutions (ISAPRES) the payment is realized per service, with tariffs accorded between the ISAPRES and the provider</p> <p><i>Colombia:</i> it is the reimbursement method to specialty physicians</p>	<p><i>Chile:</i> since the eighties public hospitals finance materials and medical inputs with this mechanism. In addition, all the treatments that are not basic pathology will be paid by service</p> <p>Private hospital in general</p>
Payment by wage	<p><i>Colombia:</i> Most of the Health Providers Institutions contract physicians by wage</p>	<p><i>Colombia and Chile:</i> it is the reimbursement mechanism to physicians in public hospitals</p>
Per capita payment	<p><i>Argentina:</i> this modality of payment is used by the Institute of Social Services for the Retired and Pensioned, and lately has been also applied to Social Works</p> <p><i>Chile:</i> it is the trend as reimbursement method to physicians in public attention. In order to calculate the per capita payment, the population is multiplied by the recommended norm of frequency of services by user (considering wages, administrative costs, and other costs like drugs), and then is divided by the population of the area where the services are offered. Adjustments take place to favor to poorest localities.</p> <p><i>Colombia:</i> The physicians are reimbursement with capitative payments by the IPS in rural zones where there are no important hospital institutions</p> <p><i>Costa Rica:</i> the new model of primary attention incorporates the per capita payment (adjusted by infant mortality rates and by age structure) as a fixed element of the reimbursement system</p>	<p><i>Argentina:</i> the excess of services caused by the payment by service to private hospitals has generated a progressive trend towards the contracting by capitation in these private services</p> <p><i>Mexico:</i> the health services in public sector (IMSS) began to use the capitative budget adjusted by risk to assign the budget to each decentralized medical area (1st and 2nd level hospitals)</p>
Payment by hospital stay		<p><i>Costa Rica:</i> reimbursement to hospitals is based in a common measurement of activity named unit of hospital production (UPH, 1 UPH = 1 stay). All the hospital activities are expressed in UPH by weight coefficients and a tariff is defined by UPH at the beginning of the example</p>
Payment by hospital admission		<p><i>Chile:</i> the “basic pathology” is reimbursed by payments associated to diagnoses</p> <p><i>Colombia:</i> the Institute of Social Security has a payment system based in diagnoses packages</p>

Source: Álvarez, Pellisé and Lobo 2000, and Instituto Mexicano del Seguro Social 2000.

III.2 Effects of Changes in Payment Mechanisms (Based on DRGs) on Costs and Providers' Behavior

Most of the literature concerning the effects of payment mechanisms in the costs and quality of health services has been developed in the context of the United States' health services –with a main component of multiple private insurers, public programs of health for subgroups of the population (Medicare and Medicaid), and a proportion of population that lacks health coverage. As a result of the change from retrospective to prospective payment, the literature examines the influence of the payment systems on medical treatment, the margin of earnings in hospitals, the average length of stay, the number of hospital admissions, and the quality of the service.⁶

When a prospective payment mechanism based on DRGs is functioning, a fixed amount is paid to the providers by each diagnosed case. In this scheme the hospitals' behavior is not clear. Hospitals can offer the service to a large number of patients that seem healthy, since the expected cost of providing the service to these patients can be smaller than the reimbursement. On the other side, hospitals can decide to provide fewer services to people, in order to avoid exceeding the expected cost. Cutler and Zeckhauser (2000) and Chalkley and Malcomson (2000) present a wide review of the literature on this topic in the United States. The studies show that the prospective payment systems diminish the average length of stay in hospitals, approximately in 20-25% during a five year period. In almost all studies, the managed care reduced medical expenditure compared to the traditional insurance schemes. However, the literature indicates that services delivered to patients can also be rationed in this kind of systems.

Managed care has also led to changes in the relationships among providers (physicians, hospitals, laboratories, etc). In most cases, it is the physician who decides how to spend the resources for the patient. With these alliances, hospitals may expect physicians to behave according to their interests, which may not necessarily be the same as the patients' interests.⁷ For example, Silverman and Skinner (2004) shows that, during the nineties in the United States, there have been cases of upcoding of DRGs to increase the reimbursements paid by Medicare. Another behavior observed was skimping, a reduction in the services offered to patients by physicians (Hsia and Ahern, 1992)⁸.

Other considerations with respect to the use of DRGs as a payment mechanism are the impact on technology and their suitability for certain types of diseases. In the case of mental diseases, the main explanation for the variation in costs is the type of hospital-facilities. Specialized hospitals receive a population with more complex and expensive conditions, these elements are not always considered in the DRGs (see Frank and McGuire 2000). In this case, payments done through DRGs would affect specialized hospitals while favoring general hospitals.⁹ In addition, in some countries it is believed that the use of DRGs does not favor the diffusion of technology because it is based on reimbursements, with fixed costs for diagnoses and specific treatments.

⁶ Since 1982, the Medicare legislation changed to authorize contracts paid in a prospective way with authorized HMOs (Health Maintenance Organizations). The prospective reimbursement was based on adjustments of age and sex to the average per-capita cost of the Medicare program "fee for service". For more details, see "Managed Care" in Glied (2000), p.717.

⁷ See the section 5 in McGuire (2000) to review the subject of the induced demand by the physicians.

⁸ Skimping can be understood as the pressure to physicians from hospitals to omit some therapies and treatments. This reduces the costs while the hospital receives a payment by a DRG destined to cover all necessary services.

⁹ Countries as Canada do not seem to use DRGs for mental diseases.

IV Guide to Implement DRGs

This section presents a basic implementation guide for a DRGs system in seven stages, from the system's objectives to the long term consolidation phase.

IV.1 Definition of the Objectives of the DRG System

The scope of the DRGs-system within the health system depends mainly on its objectives. Although the main use of the DRGs is as prospective payment mechanism to hospitals, their use is determined by the structure of the health system. In principle, the DRG system provides inputs for the elaboration of useful health budgets, with different payment mechanisms (information about the use of resources, costs estimation and hospital records). Some particular objectives of the DRGs are clinical management, budget planning, and hospital benchmarking. Within clinical management, DRGs guarantee the participation of physicians in the administration of resources used to treat patients. In the context of budget planning, DRGs are useful to compare information about resources and results in the hospital, which can be used to select the providers of services. The hospital benchmarks obtained from DRGs can help to improve quality, and to identify the causes of success in hospitals.

IV.2 Analysis of Feasibility

The implementation of a system that classifies patients in a country requires a feasibility analysis, as well as a review of the ability of such information system to describe and analyze hospital activity. The main requirement of an information system that uses DRGs is to define and homologate a minimum basic data set (MBDS). This (MBDS) considers all the information that is routinely collected in hospitals, manually or in a systematized way. During this stage, the way in which the information will be unified must also be defined since most hospitals already have the required information, although in different areas or modules.

IV.3 Choosing the Classification System for Patients

Once the MBDS is obtained, the form in which the information will be systematically grouped—the guidelines to codify diagnoses and procedures—should be established. The two main pillars for grouping patients in a DRG scheme are the diagnoses (that reflect the clinical complexity required by the patient) and the procedures (that help estimating the consumption of resources for his/her care). In general, the International Classification of Diseases (ICD) is used for coding the diagnoses. For procedures, there is a multiplicity of manuals (in this sense, it is necessary to consider that the codes of a system might not be valid—or comparable—at international levels). Some countries have developed their own classification systems, according to the specific diseases and features of the region.

Given the availability of classification systems (software), it is important to choose the most adequate, knowing the advantages and disadvantages of each possible option, depending, i.e., on the type of population cared. One of the possibilities is to develop a new classification system that takes into account the country's particular characteristics, since an important consideration is the cost of software licenses and the compatibility of the available information with the current DRGs systems. Existing DRG systems differ mainly in the coding system of diagnoses, the degree of disease complexity or severity, and the specific population to which they are applied.

IV.4 Level of Implementation

This step is related to the scope that the DRGs classification system will have within the health system (i.e. by regions, health sub-systems, or at a national level). This step is important for Latin American countries with fragmented health systems, since these are usually identified as more

expensive, and with problems of data compatibility at a national level. In this stage, the functioning of the health system and the organization of hospitals in which the DRGs will be implemented must be studied.

IV.5 Integration of the Components

The implemented information system should allow a measurement of the hospital final product (discharges), including all the tools that facilitate the measurement of the complexity and variety of inpatient diseases. For this aim, there must be an integration of the actors involved: i) the medical staff who cares for the patients, because they produce the information that is needed to develop the system that measures hospital outcomes, ii) the persons that codify, who translate the clinical information generated by physicians into codes that will allow to process discharge data and to have homogeneous information, iii) the individuals that process the information in the system to obtain statistics to gauge hospital activities, iv) the directive staff of the hospital that will use the information for managing, planning and financing.

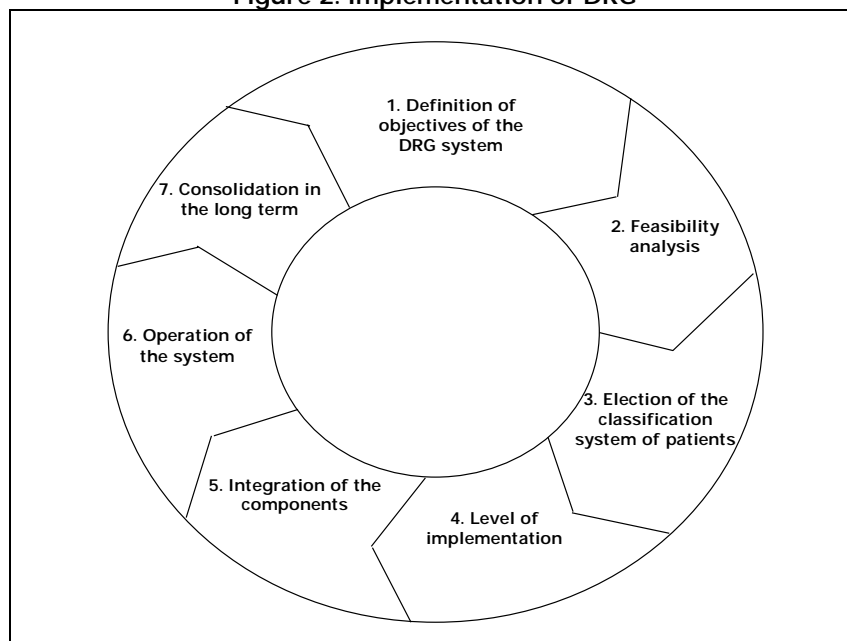
IV.6 Operation of the System

In this phase, among the aspects to be considered are the monitoring of hospitals to know how the software is operating, the identification of problems, and the clarification of doubts that arise when interpreting the information. According to the experience and results observed, during the implementation of a DRGs system successes and obstacles should be acknowledged to have an evaluation of all possible mistakes presented, and to correct them as the system is implemented.

IV.7 Consolidation in the Long Term

Once the implementation phase of the system is completed, it is important to take actions to consolidate the project in the long term to guarantee the correct use of DRGs in the process of decision making. For reducing hospital incentives to modify the information that reflect major clinic complexity and hospital activity (upcoding), an independent organism may be created--to audit the process and to verify the quality of information. Continuous training for the generation and use of DRGs information in hospitals assures the right operation of the system. An additional matter to consider is the updating of the coding of diagnoses and procedures to take into account the new diseases and advances in coding systems (see Figure 2).

Figure 2. Implementation of DRG



Source: Own elaboration.

V. DRGs: the International Experience

To understand differences among DRGs in different countries and to compare the costs of treatments and health outcomes for a variety of diseases, some of the most relevant questions are what is the type (public or private) of provision? who pays for the service?, and what is the reimbursement method used to pay providers? Structural differences in the organization of health systems explain to a large extent the variations in the way DRG are used to adjust the mechanisms of payment to providers. Another of the elements that affects payment mechanisms to redistribute resources in order to improve incentives between providers and consumers is the level of decentralization, which allows the transfer of funds between regions, as well as hospital autonomy when charging for services provided. At an end there are decentralized countries such as Canada. On the other end there are a large number of Latin American countries, which have an integrated health system. Among these cases, Spain stands out (see Box 1) as its health system decentralization process has taken place relatively fast, in recent years.

V.1 How do DRGs differ?

The identification of differences between DRG systems across countries would, ideally, consist of gathering national and regional databases and compare their contents. Moise (2001) documents thoroughly the DRGs system composition in OECD countries. Moise groups the information of DRGs in: inpatient, hospital, outpatient, drugs and health results. Table 5 shows that some OECD countries have developed their own DRG systems (scales and classifications). In addition, it is common to find different information levels according to the specific situation of each country (federal, state and regional). In some countries the DRGs specify the payment methods directly; whereas in others the DRGs only have an indirect impact related to adjustments in the public health budget. As expected, the availability of information fluctuates through the time. According to the different health system structures, DRGs can be applied in both, private or public hospitals.

The main differences among DRGs can be explained by:

- i) Differences in costs of treatments and health outcomes.
- ii) Differences in data gathering, considering the level of decentralization.
- iii) Differences in the availability of information on hospitalizations and costs.
- iv) Specific differences: characteristics of patients, identification of diseases, treatments, admissions, and discharge hospital data.
- v) Differences in the rules of information privacy.

The final part of Table 5 depicts DRGs in Colombia, Mexico and Brazil. In these countries, it has been possible to document differences in DRGs' systems based on several sources. The DRGs information is new, limited and not representative at the national level. For these cases, DRGs do not provide additional information about insurance characteristics or drugs use. The best practices found in DRGs systems are shown in Table 2.

Box 1. Decentralization Process in Spain

In 1978, the 50 Spain provinces were reconfigured into 17 autonomous communities (AC). Each AC was required to establish democratically elected parliaments and to adopt a degree of self-rule. The decentralization of the region was designed to be implemented gradually, based on the administrative capacity of each AC. In support to the incremental approach, a fast route (for regions demanding autonomy) and a slow route (for regions not demanding immediate autonomy) were established. Fast route regions were granted immediate autonomy. Slow route regions required to: observe a five year waiting period gain public and political support for autonomy, win the approval of all provincial councils and 2/3 of municipal councils, and administer a referendum. The central government established a block grant funding system. The AC received blocks that included funding for education, health and transport.

The AC that used the fast route were: Vasco Country, Galicia, Catalonia, Andalusia, Navarre, Canaries and Valencia Country; and the ones who used the slow route were: Castile y Leon, Castile - La Mancha, Aragon, Extremadura, Cantabria, Murcia, Asturias, Baleares, La Rioja and Madrid.

The health care power transference to the ten communities of slow route negotiated during the period 1999-2001, and that took place in January of 2002. This is the greatest institutional change that has taken place in the Spanish health system since 1996. Eight of the ten communities of slow route (and two out of the seven of the fast route) had populations inferior to two million people in 2001. In these cases the effect of the economies of scale is smaller. The agreements reached on health transfers to the communities of slow route have been characterized by political discretion and lack of transparency.

Most of the public expenditure on health was assigned by the General State Budget under the responsibility of the Ministry of Health. This money was then transferred to the National Institute of Health (INSALUD), which was responsible for managing health care institutions in ten Autonomous Communities. INSALUD also acted as a distributor and, in this role, transferred funds to the seven communities that were already autonomous. The regional governments received these funds and transferred them to the Regional Health Services. From 2002, the situation has dramatically changed; coinciding with the end of the devolution process of Health Care, a new model of autonomous general funding has been set up. Health care is no longer financed in a different way than any other devolved powers. The financing of resources comes from a higher degree of fiscal co-responsibility of the AC, which now has the power to manage part of the tax collection from the general income taxes and VAT, plus the total tax collection of some specific taxes on alcohol drinks, hydrocarbon consumption and others.

When the basic organic structure of the Sanity and Consumption Ministry was modified, the disappearance of INSALUD and its adaptation into a smaller dimension entity was established. This new organism, called National Institute of Sanitary Administration (Instituto Nacional de Gestión Sanitaria) has the same administrative functions of rights and obligations as the INSALUD. The final result of the decentralized state is not defined. The number of AC has not been anticipated, nor the competitions that they will have, nor the degree of autonomy. The main characteristic is the anticipated creation of AC that, together with municipalities and provinces enjoy autonomy for the management of their respective interests. Similarly, the Constitution establishes a system by which the competencies assumed by the Regions can have different degrees of intensity, according to the extent to which legislative and executive competencies are acquired (complete, limited or only executive competencies). This process has had complications in three main aspects: the complexity of the requirements for the constitution of the AC (through the different routes), the lack of definition of the decentralization model, and due to its development, it is conditioned to the parliamentary system of majorities and to the correlation of political forces.

Table 5. Information in the DRGs Databases in Different Countries
a) Inpatient Information (1/2)

Country	Principal data set and time period	DRG (Case Mix) system	Inpatient information			
			Coverage	Representativeness	Linkage capacity (follow patients over time)	Other socio economic characteristics, availability of supplemental insurance
Australia National	National Hospital Morbidity Database (NHMD) 1989-1996/97	AN-DRG	All patients discharged from both public and private acute care hospitals	All individuals residing in Australia	Yes	Accommodation status, insurance status, compensation status
Australia W- Aus	Western Australia (Hospital Morbidity Data System) HMDS 1970-	AN-DRG (version 3,1) introduced 1996/1997	All inpatients episodes for defined admitted patients to public, private and freestanding day hospitals in Western Australia	All individuals residing in Western Australia	Yes	Indigenous status, marital status, employment status, insurance status, payment classification
Belgium	Résumé Clinique Minimum & Résume Financier Minimum (RCM-RFM) 1988-1997	AP-DRG- version 10	Includes all patients discharged from 15-75 hospitals per year (teaching and general public and private)	All hospital stays	Yes	Mutuality code, private insurance status
Canada Ontario & National	Discharge Abstract Database:CIHI & Statistics Canada 1979/80 -1998/99	Case Mix Groups (CMG)	All acute care hospitalizations in Ontario & Canada	All individuals residing in Ontario & Canada	Yes	Possible (can be linked with census data using postal code)
Canada Quebec	MED-ECHO 1985-1995	No DRG grouping	All acute care hospitalizations in the province	All individuals residing in Quebec	Yes	Possible (can be linked with census data using postal code)
Canada Manitoba	Manitoba Health Research Data Repository (MCHPE) 1985/86 - 1998/99	No DRG grouping	All hospital inpatient discharges in Manitoba (includes outpatient services)	All individuals residing in Manitoba	Yes	Can provide measures of socio-economic status
Denmark	National Patient Register 1978-1998	Nord DRG 1987-1998	Includes all inpatients discharged from Danish public hospitals	All individuals residing in Denmark (and persons visiting Denmark)	Yes	Yes, by linking it to other population registers. Cannot observe whether patient has supplementary insurance
France	Données PMSi 1994-1997	Groupe Homogène de Malades (Adapted from US classification)	Public database (includes most public hospitals); cost data base (includes 40 public hospitals); private database	Public and private hospitals (all individuals residing in France); Cost data base (around 5% of admissions)	No	No

a) Inpatient Information (2/2)

Inpatient information						
Country	Principal data set and time period	DRG (Case Mix) system	Coverage	Representativeness	Linkage capacity (follow patients over time)	Other socio economic characteristics, availability of supplemental insurance
Great Britain	Hospital Episode Statistics Until 1998	Healthcare Resource Groups	Population admitted to public hospitals	Public hospitals	No	No
	Oxford Record Linkage Study 1968-1986	No DRG system	Population in the Oxford area		Yes	
Italy	Schede di Dimissione Ospedaliera (SDO) Since 1993	Raggruppamenti Omogenei di Diagnosi (based on US DRG version 10)	Includes all patients discharged from Italian hospitals	All individuals residing in Italy		Marital status
Sweden	Hospital Discharge Register 1987-1997	Nord DRG	Includes all patients discharged from public hospitals in Sweden, private facilities not included	All individuals residing in Sweden (and persons visiting Sweden)	Yes	Yes, by linking to other population registers
United States	5 or 100% of Medicare claims data 1984-1996	US DRG grouping	All acute care hospitalizations (Part A)	99% of population aged 65 and over; includes population under 65 eligible for program under disability or End Stage Renal Disease	Yes	Other SES implicit with MSA; supplemental insurance
Mexico		HCFA	IMSS inpatient	IMSS hospitals	No	No
Colombia	Since January 2003	IR-DRG	8 hospitals (4 in Medellin, 4 in Bogota; 5 private, 3 public)	Not representative at a national level	No	No
Brazil	AIH (Authorizations of Hospital Admissions)		Public hospitals in Brazil	Public hospitals	No	No
	Morbidity database		Hospitals of the Faculty of Medicine of the University of Sao Paulo	Inpatients in hospitals of the Faculty of Medicine	No	

a.1) Inpatient Information, cont. (1/2)

Inpatient information						
Country	Diagnosis Code	Diagnoses	Procedure code	Procedure	Costs/Fees	Other information
Australia National	Australian version of ICD-9-CM	Primary diagnosis + 31 possible additional procedures	Australian version of ICD-9-CM	Principal procedure + 31 possible additional procedures	Estimated average cost for each AN-DRG	Overnight patients, type of care (rehabilitation, palliative, non-acute, other); waiting list status
Australia W- Aus	ICD-9; ICD-10 AM (as of July 1, 1998)	Primary diagnosis + codiagnosis + unlimited number of additional diagnoses	ICD-9-CM? ICD-10-AM (as of July 1, 1998)	Principal procedure + all "significant" procedures	Estimated average cost for each AN-DRG	Days in ICU, clinician performing principal procedure
Belgium	ICD 9	Primary diagnosis + additional diagnoses	ICD-9-CM	Primary procedure + unlimited number of additional procedures	Fee billing information (divided into 70 categories)	Number of days in ICU, type of department
Canada Ontario & National	ICD 9	Primary diagnosis + 15 possible additional diagnoses	Canadian Classification of Procedures (CCP) and ICD-9-CM	Principal procedure + 9 possible additional procedures	No (possible to estimate using information collected on resource use)	Specialty of physician performing procedure; date of main procedure; type of admission (emergency, urgent, elective)
Canada Quebec	ICD-9	Primary diagnosis + possible additional diagnoses	ICD-9-CM	Principal procedure + XX possible secondary procedures	Cost estimates are possible	
Canada Manitoba	ICD-9-CM	Most responsible diagnosis + 15 possible additional diagnoses	ICD-9-CM	Up to 12 procedures	Yes	
Denmark	ICD-8 up to 1993; ICD-10 since 1994	Primary diagnosis + an indefinite number of secondary diagnoses	SKS - code NOMESCO	Primary procedure + an indefinite number of secondary procedures (only surgical interventions are coded)	No	
France	ICD 9	Primary diagnosis + 50 possible secondary diagnoses	ICD-9-CM	Primary procedure + 50 possible secondary procedures	Yes, for the base cost, disaggregated	ICU use

a.1) Inpatient Information, cont (2/2)

Country	Diagnosis Code	Diagnoses	Procedure code	Procedure	Costs/Fees	Other information
Great Britain	ICD 9	Yes	Yes		No	
	ICD 9	Yes	Yes		No	
Italy	ICD 9	Primary diagnosis + 3 possible secondary diagnoses	ICD-9-CM	Primary surgical procedure + 3 possible secondary surgical procedures	Yes (total cost of stay)	
Sweden	ICD 9 (1987-1996) ICD 10 (1997-)	Primary diagnosis + 5 secondary diagnoses; Primary diagnosis + 7 secondary diagnoses (depends on how dagger-asterisk codes are used)	Surgery codes only, Swedish classification; Surgery codes only, NOMESCO (Nordic classification)	8 procedure codes, none specified as primary; 12 procedure codes, none specified as primary	No	Type of department
United States	ICD 9	Primary diagnosis + 9 possible secondary diagnoses	ICD-9-CM	Reliable claims reports for all "major" procedures (10 possible codes)	Yes, possible to disaggregate extensively	ICD & CCU use; information following acute admissions
Mexico	ICD 9	Primary diagnoses + 2 secondary diagnoses	ICD-9-CM	5 procedures	No	No
Colombia	ICD 9	Primary Diagnosis + 10 secondary diagnoses	ICD-9-CM	Primary procedure and up to 60 additional procedures		No
Brazil		Primary Diagnosis + 1 secondary diagnosis Primary Diagnosis + 10 secondary diagnoses		One main procedure	Yes	No
	ICD 10		ICD-10	Up to five procedures	Yes	No

b) Information about Hospital and Outpatient (1/2)

Outpatient Information			Pharmaceutical Data Information	Health Outcomes Information		Possibility of Linkage With:
Country	Type of information of the procedure	Costs/Fees	Drug consumption and codes	Mortality	Rehospitalizations or other outcomes information	Other dataset
Australia National	Private medical services provided out-of-hospital + medical services provided in public and private hospitals for private patients (does not distinguish between services provided in-hospital and out of hospital)	Free of charge	No	Yes	No	
Australia W- Aus	See above	See above		Yes	No	
Belgium	All ambulatory care services covered by mutuelles. Information is available within each mutualité. A national level single source of information available since 2000	Yes (billed)	Anatomical Therapeutic Chemical code	Yes	Rehospitalizations allowed if patient is re-hospitalized in same hospital	
Canada Ontario & National	All fee-for-service claims to physicians - include inpatient, outpatient and ambulatory care services (patient demographic information but no patient identifier, no diagnoses)	Physicians' billings for services rendered	No data	Yes	Rehospitalizations	
Canada Quebec	All diagnostic or therapeutic procedures performed in Quebec where physicians were reimbursed by the RAMQ	Physicians' billings for services rendered	Linkage with special provincial drug scheme claim data	Yes	Rehospitalizations	
Canada Manitoba	All fee-for-service claims paid to the physicians	Physicians' billings for services rendered	Physicians' reimbursements for services rendered	Yes	Yes	
Denmark	No information	Primary procedure + an indefinite number of secondary procedures	No	Yes	Yes	
France	No, the administrative encoding of claims has no possible links	No	No	Inpatient mortality; not related to death registry	No	No, except local specific data

b) Information about Hospital and Outpatient (2/2)

Outpatient Information			Pharmaceutical Data Information	Health Outcomes Information		Possibility of Linkage With:
Country	Type of information	Costs/Fees	Drug consumption and codes	Mortality	Rehospitalizations or other outcomes information	Other dataset
Great Britain	No information		No	No	No	No
Italy	Includes information about whether the patient was admitted or not to a day-hospital, and number of days in day-hospital	No	No	Yes, linkage In-hospital mortality (includes information on results of autopsy)	Yes	Yes No
Sweden	The project has started to develop registries of outpatients	No	No	Can be linked with Cause of Death Register (COD)	Yes	Allows linkage with other registries (MI, Cancer, Apoplexy, Hip Fracture, Diabetes), Pharmaceutical
United States	Ambulatory care (Part B); similar to the inpatient database + more reliable coding of minor procedures	Total cost (or public reimbursement)	Generally linkage is not possible.	Mortality (7 days, 1 month, 3 months, 1 year, possibility of linkage with death registry)	Follow up of readmissions (plus comorbidities)	
Mexico	Without information	No	No	Yes	Only 30 days after the exit	No
Colombia	No	No	Yes	Yes	Yes	No

Brazil

Source: Moise (2001), IMSS (2000), Kerguelén (2004), Gesaworld (2005) and Rodrigues Zanetta (2002)

In Eastern Europe the transition from communism to democratic republics has affected health systems and their financing. The main problem in the region is the health coverage of the population. Some countries are developing payment systems to hospitals, particularly DRGs systems. Several studies report reductions in the length of stay and increases in the number of admissions to hospitals in Hungary, Poland, Kazajstan, Rumania and Slovenia (Langenbrunner 2002, Dobre 2002). Due to the lack of data to determine national costs, in countries like Bulgaria imputed costs from American DRGs have been used.

Box 2. Best Practices

- When choosing a classification system, most countries implement already developed systems, such as American DRGs, which have been used longer. Other countries try to use systems that were developed in countries with health systems characteristics similar to theirs.
- The ICD9 is currently the most commonly version used for codification of diagnoses and procedures.
- Some countries contract with a specialized consultant for the training and implementation processes, in order to take advantage of the experience in other countries.
- The cost of developing new software may be very high. When hiring a specialized consultant, an important element to consider is the cost of the license—software—of the different classification systems
- It is important to identify the individuals in the database to follow them through time. This helps to observe and analyze the possible causes of re-hospitalizations in a period of time.
- A very useful characteristic to obtain more sophisticated analyses is the linkage of the DRGs databases with other databases that provide more information. The most used databases are of hospital claims, hospital mortality and access to other health institutions.
- In a great number of countries, DRGs are also used for hospital benchmarking, which allows identifying and implementing benchmarks in hospitals.
- The creation of an autonomous and independent organism of auditory to verify the quality of the information is convenient because it can identify and sanction possible upcoding cases.
- The use of DRGs as a reimbursement method is applied mainly in decentralized health systems, where hospitals have the autonomy to charge for the services provided.

VI. Conclusions

The topic of DRGs is of interest for social security institutions because it is, in many countries, the main payer to hospitals. The DRGs are classification systems of patients based on the use of resources and clinical characteristics. They were created in the United States in the seventies to monitor hospital activity. The application of DRGs as a cost containment mechanism began in 1983, when Medicare started to use them as a prospective payment system that paid a fixed amount for each inpatient.

There is evidence that payment mechanisms based on DRGs in “managed care” health systems (in United States and other countries) reduce the costs of services, based on rationing. Nevertheless, other health system’s characteristics such as the decentralization level, the separation between financing and provision, and the coverage level are important to determine the differences in health expenditure across countries.

There are differences in DRGs systems among countries. The most important are the decentralization level, the payment mechanisms used, and the availability of information. The extent to which DRG are representative of the population (local, regional or national) is another element that relates to public or private financing of hospitals.

The DRGs can be useful for countries that wish to modify the payment mechanisms of their health systems. This document includes a guide to DRGs implementation. The central aspects of DRGs systems focus on the codification, the software, the staff training, and the application of DRGs for the preparation of health budgets.

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