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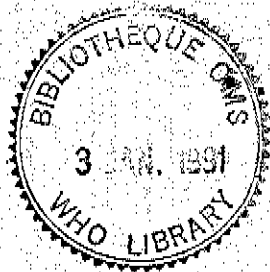
DIAGNOSIS-RELATED GROUPS:
THEIR INTRODUCTION AND APPLICATION

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Management of planning and resource allocation

Before 1990, Member States should have managerial processes for health development geared to the attainment of health for all, actively involving communities and all sectors relevant to health and, accordingly, ensuring preferential allocation of resources to health development priorities.

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DIAGNOSTIC RELATED GROUPS - utilization
DELIVERY OF HEALTH CARE - economics

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Diagnosis-related groups (DRGs) are designed as a means of classifying hospital patients from the medical standpoint and at the same time in terms of resource use. They are one of the ways of describing the case mix in a hospital patient population. The information they provide may be used in a number of fields, such as management, planning and evaluation in hospitals and hospital systems, funding, clinical treatment (patient management and quality assurance), or giving those interested some idea of hospital morbidity. DRGs were first developed in the United States of America in the seventies, and first adapted for system-wide applications at the beginning of the eighties. They are now in current use or being tried out in a great number of countries, and in the case of WHO Member States in the European Region, also in very different types of health care system.

This paper will cover the introduction of DRGs in a hospital or hospital system, aspects of their application such as performance measurement and budgeting, the prospects for non-hospital case-mix specifications, and some conclusions connected with health policy. It is specifically based on the reports on several activities concerned with DRGs conducted by the WHO Regional Office for Europe (Health Economics unit), and especially the results of two meetings:

- "Study on systems of payment by type of service or patient", Leuven University, 12-13 October 1987, at which the use of DRGs was the main topic; and
- "Application of DRGs to hospital budgeting and performance measurement", Cardiff, 23-25 November 1989.

1. The introduction of DRGs

One of the first tasks in implementing a DRG system is to produce the data required for grouping patients into DRGs. This mainly involves collecting data elements, coding diagnostic and procedure data, and ensuring that the data are pertinent and reliable. Length of stay is the variable used to indicate the resources needed. When determining DRGs it is not necessary to integrate information on costs, although such information is certain to be useful for later analyses. Section 1.1, therefore, will deal with the activity data required for the DRGs and section 1.2 with ways of integrating cost data.

1.1 Activity data

For DRGs, patient data, such as age, diagnoses (including the primary diagnosis), and the procedures used are required. DRGs were developed on the basis of the US Clinical Modification of the International Classification of Diseases (ICD-9-CM), including the codification of surgical and other procedures. European diagnostic codes are often adaptations of ICD-9 or ICD-8. Conventions for coding operating theatre procedures vary widely. In order to apply computerized "DRG-groupers", which use ICD-9-CM to classify patients into DRGs, the available data thus have to be mapped to the input format of the groupers. However, all projects at present in progress have completed at least initial translations of national diagnosis and procedure codes into ICD-9-CM. Equivalences established between national codes and ICD-9-CM may be lost when WHO introduces ICD-10. It would be of benefit to European DRG projects, therefore, if some thought were given to this problem in considering ICD-10.

The availability of data may pose special problems for those countries that do not have national systems for collecting discharge abstracts. Furthermore, the introduction of DRGs may have to be preceded by the development of an underlying information system. For example, in the process of coding hospital discharge diagnoses and procedures, semi-automatic systems have the advantage of coding directly in terms of ICD-9-CM on the basis of keywords and menu choices presented on a microcomputer. The type of software needed is available in English and has been produced or is planned in other languages. Automation may facilitate the work of medical records departments and ensure standardized coding, thus eliminating some of the problems of data quality.

It must be borne in mind that substantial variations between the coding schemes used in Europe may have important implications for the transferability of DRG systems. The continued use of transcoding schemes to improve system transferability should be subject to reliability and validity checks through control studies. Automatic diagnostic coding may also increase the reliability and validity of transcoding procedures.

The quality of the data base used, measured by criteria such as completeness, validity and reliability, affects the correctness of assignments to particular DRGs. However, even where errors are found in the data base, empirical analyses have shown that the DRG classification system is quite robust. Aspects of data quality such as under-reporting of some data elements will also be affected by the use of DRGs for planning and financing purposes. Such use may set incentives to increase data quality or even reverse the problem into over-reporting. If DRGs are used in determining financial allocations, data quality problems should also be checked for their financial implications.

Some countries have made or are making minor modifications to the United States DRG classification system in order to meet their local needs. While it is thought that in general the use of DRGs in the different European countries remains similar, the possibility of setting a European standard for their use has been mooted but has not yet gone beyond the discussion stage.

1.2 Cost data

The DRG system may provide a common frame of reference for comparing the costs of providing hospital care by type of diagnosis in different settings, for example in different European countries. Furthermore, standard cost per DRG can be used for such financial purposes as setting DRG prices at a national level. To determine standard cost per DRG, it is essential to have good-quality cost data and detailed cost information for hospitals as a whole, hospital departments and individual physicians. Like DRG classification itself, the estimation of DRG costs will necessarily depend on the specific health care context, the availability of data and the objectives in view. In most instances, disaggregated cost data attributable to individual cases are needed in order to determine standard cost. Whether they are available depends essentially on the hospital accounting systems used. In many systems, hospital accounting is based on similar principles, but relates to different national and service environments, is used for different purposes and is subject to different health care regulations. Countries which have historically funded hospitals on an overall basis, rather than per patient, do not as a rule produce cost data that can be disaggregated to costs per patient. Systems that already bill patients for the care they have received can more easily adapt to DRG-based costing.

A first problem in DRG costing - potentially affecting the quality of comparisons - is to determine the cost categories to be included. Some countries include capital costs, some exclude them. Subsidiary problems are the method used for valuing capital (insurance value, depreciation, replacement) and the dividing line between equipment and capital. Unlike the United States, European countries tend to include physicians' salaries in DRG costs, but this is not expected to give rise to problems. The administrative costs of public health departments in planned systems and insurance company overheads in market systems are not generally included in hospital accounts. The magnitude of those costs may vary between countries, and even within a given country, and differing proportions may be carried by individual hospitals.

To estimate costs on the basis of DRGs, data should be available at the cost centre level. The following steps may be distinguished:

- at the very least, cost centres will need to be differentiated into medical, nonmedical and support cost centres;
- the costs within the support cost centres must be allocated to the final medical and nonmedical cost centres;
- depending on the availability of the information needed for estimating appropriate allocation statistics and on its accuracy, final cost centre costs may be disaggregated to the costs per DRG.

The passage in turn from one stage to another will require basic information on the proportion of resources used by the different cost centres and departments. If such information is not directly available locally, consideration should be given to using substitutes such as relative value unit scales from other health systems. Even if the information is available, however, the comparability of costing techniques may still be limited because of the absence of internationally standardized definitions of hospital cost centres. When relevant detailed cost information is completely lacking, it has been suggested that initially DRG standard costs should be based wholly or in part on cost weights obtained in other European countries or in the United States. In any case, the transferability of substitutes for cost data would have to be analysed very carefully in order to avoid unintended biases in the incentive structure. Last, but not least, the need for precision in any cost category will vary with the extent to which costs in that category can be influenced by physicians.

2. Performance measurement by DRG

To cover the different types of patient treated in hospitals, performance measurement must be adjusted to take case mix into account. Performance measurement by DRG must be further developed by adopting appropriate performance indicators, in defining which management skills and medical expertise are important. Administrators, doctors, nurses and other personnel using the indicators may require additional training in how to use them correctly. Suitable hardware and software will need to be developed for these applications.

2.1 Performance indicators

Cost and activity profiles by DRG would enable performance or efficiency to be measured at a number of levels in the health services. The type of performance measure used will naturally depend on the type of cost and activity profile obtained and on the health care system in the country concerned. At macro-level, global comparisons of hospital operating efficiency between countries or regions would become possible. At micro-level, comparisons could be made between hospitals, departments or physicians. A number of methodological issues have to be resolved. The larger the number of cases in any DRG, the more precise the information obtained. Problems have occurred with the quality of DRG information for low-volume DRGs at hospital level. At the physician level of analysis, even high-volume DRGs may contain only small numbers of cases. Between-patient cost variation due to variations in severity may be beyond the control of physicians. Thus, definitions of outliers (patients who stay in hospital for an atypically long time) and severity-of-illness indicators are important.

Performance indicators may fall into different categories, covering, inter-alia, admission/discharge, clinical and outcome/quality measures. Within the admission/discharge group, indicators frequently used include medical and "delay" (pre-operation) days, the re-admission rate and the source of referral. Measures based on length of stay (e.g. medical/nonmedical days) are significantly more valuable for intra-hospital and inter-hospital comparisons when standardized for case mix. Clinical indicators will include the infection/cross-infection rate, complications, symptom relief, etc. Indicators such as the hospital mortality rate are being increasingly used in an effort to develop a measure of outcome which can be more generally applied. The possibility of better evaluating the significance of variations in the rates of use of procedures and the monitoring of waiting lists has also been discussed. Allocation of staff, e.g. nurses, between units could be improved by DRG-based measures of workload. Future research might usefully explore the possibility of using DRGs to disaggregate hospital activity on the basis of such variables as patient age, hospital size and medical specialty. This type of information might also be useful in developing standards for singling out and controlling unnecessary hospital admissions.

2.2 Quality assurance and cost-effectiveness analyses

Quality control and outcome measurement are becoming increasingly indicated as priority areas for performance measurement and monitoring. Quality of care could be measured on the basis of DRGs. Quality assurance is yet another field that needs to be further developed. Often the quality of care is considered on an ad hoc basis, health indicators or peer review processes being generally used for the purpose. Possibilities of assessing the quality of hospital care in a routine manner, using DRGs as a framework, could be explored.

Detailed DRG activity profiles would permit a regrouping of the different components of the care process to form an "ideal treatment regime", defining the optimum medical treatment for a patient of a given type within each component. The crucial issue in this case would be "Who defines standards of care (correct length of stay, appropriate diagnostic tests, etc.)?". This could best be done on an interdisciplinary basis.

Integrating cost assessment with quality assessment permits cost-effectiveness evaluations to be made. For example, one health outcome measure, quality-adjusted life years (QALYs), has already been used for many diagnoses and procedures and could possibly be fitted into a DRG framework. Comparisons may be made between the amounts of expenditure incurred to achieve a given result, i.e. a comparison within a DRG, by different methods of treatment, all of which lead to the same patient outcome, or between the results obtained with a fixed level of expenditure in different DRGs to determine which obtained the best health outcome at a given cost, with a view to setting social priorities for treatment.

One of the problems in cost-effectiveness analysis and quality evaluation is to determine sources of variance in resource consumption within an individual DRG. Factors that influence these variations include differential diagnosis within a DRG, differences in prognosis (severity) and differences in the efficacy and efficiency of the caring process. Not only may the methods of treatment preferred by the physicians differ in different settings but the standards of care may do the same.

2.3 Health planning

DRGs can provide health planners with a useful framework for examining changing situations because they represent an interface with medical staff. Needs and the availability of resources can be determined in greater detail once case-mix can be taken into account. The geographical distribution of care can be monitored in terms of DRGs. DRG-based production targets such as numbers of hip transplant operations per 1000 people could be set. Simulation models for health planning can be developed on the basis of DRGs and standard treatment profiles defining the number of beds needed, the number of doctors and nurses required and the use to be made of resources (diagnostic tests and services). Such models could be used to estimate the effects of closing an old hospital or department or opening a new one, or the effects of demographic changes on hospital morbidity. Variations in morbidity that are not related to demographic changes, new treatment technologies, different levels of resources, and different treatment priorities could be investigated by using the new method.

3. DRG-based budgeting

How DRGs are used for budgeting and finance purposes depends of course on the way in which the hospitals are financed in the country concerned. In this paper, the discussion on financial applications of DRGs has to be restricted to very general considerations. The incentives provided by the application of DRG-based budgeting may increase the efficiency of resource management and, consequently, of hospital care. The development of applications for hospital budgeting may direct attention to a number of needs, including:

- hospital activity projections adjusted for case mix;
- hospital cost projections adjusted for inflation (wage increases);
- special (e.g. regional or teaching-related) adjustments appropriate to the health care system concerned; and
- appropriate adjustments for capital costs.

Budgeting applications may also encourage organizations to give serious thought to such matters as the designation of centres of responsibility for resource deployment, the selection of appropriate channels for the dissemination of information and the interpretation of the relevant statistical indicators for management purposes. DRG costing could enable hospital budgeting to be decentralized. Budgets could be held by departments or even by physicians, provided that enough cases were treated in the relevant accounting period to smooth out distortions due to random variations in the complexity of cases and the workload. In view of all the above, further evaluation of the potential outcomes of using DRGs as an element in the budgeting and/or financing process would seem to be needed.

4. Patient classification systems for outpatient care

In view of the importance of properly organizing the various sectors of health care, patient classifications should preferably cover the whole health care system. As a step in that direction, patient classifications could first be developed that included such components of the system as community, primary, psychiatric and geriatric care. Within each sector, the classifications could apply similar techniques for designating the different types of case and could be designed to achieve similar aims, such as the support of efficiency and quality of care. However, the specific characteristics of the health care sector under consideration must be taken into account when transferring classification or application techniques. Patient classification systems as a whole should also provide incentives to ensure that care is provided at the most appropriate sites.

When designing outpatient classification systems it should be borne in mind that ambulatory care differs from the hospital sector, in that it is likely to involve a greater number of care providers and visits for treatment and more varied morbidity patterns and styles of treatment. Its share in the total health care budget, including the discretionary element, will be considerably different. The data bases available may be less well developed and less progress may have been made in developing suitable methods and solving case mix problems. In attempts to use case-mix standardization as a tool for comparison, the influence of factors such as the medicalization of social problems, the overuse of drug therapy and inadequate coordination of inpatient and outpatient care must be taken into account. Ambulatory surgery has been singled out as being specifically suited to the development and application of patient classification techniques and their use for that particular purpose may serve as an example of how they could be employed for comparisons between interrelated health care sectors.

5. Conclusions

The classification of patients on the basis of DRGs provides additional information and a common basis for discussion and cooperation between the major disciplines involved in health care. With only minor modifications DRG classification has been adopted in preference to other classification systems of acute hospital patients by most participating country projects. European standards for comparison of hospital activity seem feasible. They could provide for the transcoding of diagnoses and procedures, the establishment of a European computerized data base that could be accessed by any project, and the definition of European DRGs. The use of comparable coding systems should be encouraged and guidelines for coding drawn up. The introduction of ICD-10

may involve redoing the work already carried out in transcoding ICD-9 for use in designating DRGs in Europe; decisions on ICD-10 should therefore take into account the information needs of European DRG classification systems.

Attainment of health for all by the year 2000 could be facilitated by performance measurement and health planning based on DRGs. Output targets could be given practical expression in terms of DRGs. DRGs could be used for analysing regional variations in the provision and quality of care, demographic changes, and changes in morbidity, procedures and treatment. New approaches to health care finance and budgeting systems, based on DRGs in particular and patient classification systems in general, are already being developed and implemented. They should be used to systematize the provision of incentives and the carrying out of cost-effectiveness evaluations in the provision of care. The use of cost profiles based on patient classification systems for hospital, departmental and clinical budgeting purposes should be investigated. DRGs will be widely used only if incentives are given for using them.

The implications of the use of DRGs for health service management should be evaluated. A project should be designed to test and evaluate the potential of a management system based on the use of DRGs for performance measurement and budgeting decisions; it should cover the key issues of information technology, coding systems, medical records, service design, organizational developments and resource management and pass through prefeasibility, feasibility, and implementation stages, with evaluation throughout. In view of the comprehensiveness required, projects should cover a region rather than just a single hospital. Sets of guidelines for the development and implementation of DRGs should be produced.

Collaboration and the exchange of information between European projects should continue. Steps should be taken to ensure that progress in the development of case-mix measures and the experience gained in the application of patient classification techniques are widely reported. Great efforts should be made to develop appropriate and practicable measures of quality of care and health outcome connected with the provision of services. Support should be given to the further development of DRG-based performance indicators with a view to undertaking international comparisons of the results obtained by applying the means of measurement developed. Training should be given to health care professionals in the use, presentation and interpretation of case-mix measures and their applications in health care. The contribution that can be made by clinicians is vitally important. The technical aspects of DRG use, especially the computer technology needed (hardware, software, etc.) should be thoroughly investigated.

Finally, the use of patient classification systems should be extended to include the entire care process (ambulatory, long-term, psychiatric, chronic and geriatric) with a view to ensuring the integrated evaluation and management of care.