

# WinSIG



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# WinSIG

## WHAT IS IT AND WHAT DOES IT BRING TO THE MANAGERIAL DEVELOPMENT PROCESS?

### 1. WinSIG BACKGROUND:

WinSIG is the most recent version, now in the Windows environment, of the Management Information System (SIG) computer program developed by the Pan American Health Organization (PAHO). Over the last two years, the Organization has been reviewing and upgrading it in order to better respond to current approaches and emerging practices in the process of sectoral reform, particularly with regard to efficiency with quality, the allocation of resources in keeping with social productivity criteria, cost containment, and payment for services. The new version, called WinSIG, transfers SIG to a Windows platform. It also adds new functions in order to make it easier to analyze the relevance and quality of production, negotiation and monitoring of management agreements, and costs billing; this is achieved through the addition of new modules to process the morbidity seen, set up treatment protocols, define related diagnoses groups, and to cost services. The system, which is in use in many countries of the Region, is thus set up with optimal conditions and comparative advantages to meet the cooperation requirements of the countries involved.

SIG is also an analytical decision-making tool, in the context of the productive management process of the health systems in the Region of the Americas. In fact, its chief contribution is not in generating new information, but in selectively relating information that already exists in order to provide the manager with a strategic vision for administration of health facilities or systems.

What is the intended role of the Management Information System? The answer to this question can be framed in three ways. First, SIG is not a panacea or magic formula for solving problems in the management of health systems and services; these are beyond the scope of any one methodology. Second, SIG is a management methodology that helps generate the new institutional and managerial culture that characterizes public sector reform. Third, SIG prioritizes *social productivity*, but within the context of the three critical dimensions of health services coverage: equity, effectiveness, and efficiency.

In any case, it would seem evident that equity, effectiveness, or efficiency cannot be favored individually without courting serious distortions in institutional realities, which often behave with a high degree of interdependence, in a complex interrelationship of cause and effect. It is difficult to conceive of equity in a context of squandered resources, although a certain level of efficiency is perhaps achievable without a major impact in terms of quality or equity.

Thus, the evolution of the old Management Information System sought to relate efficiency more closely to the quality and relevance of production, gearing both toward equity under the concept of *social productivity*.

Factoring in these interdependent relations, the upgraded version of SIG focuses on productivity –efficiency with effectiveness. The underlying purpose is to promote a change of institutional culture and management styles in two important and complementary directions.

On the one hand, it is essential to the process of change that a greater sense of social responsibility for management of resources be imbued in those who --albeit in different functions-- are part of the health system. The health systems should incorporate mechanisms for quantification of results and accounting so that the community has a reasonable certainty that it is getting services of a quality and quantity appropriate to its needs and consistent with its level of social investment in health.

On the other hand, managers should take on the challenge of optimizing the social productivity of resources in order to achieve higher coverage levels with greater equity. The notion of productivity used here integrates the concepts of efficiency (resource performance) and effectiveness (services impact) within a perspective of social equity, and can be defined as the efficiency with which resources are transformed into services with a sufficient degree of relevance, quality, and coverage for effective attainment of development objectives (measured in terms of satisfactory response to the needs of the citizen/beneficiary of the health services).

It is important to understand the double nature of SIG as both a *tool* and a *process*. As a tool it basically provides information essential to decision-making, with a comprehensive vision, but with selective strategies for targeting and intervention in critical areas of productive management. From this angle, SIG is a method to select and relate critical components of different information subsystems in order to provide an overall vision of the organization or facilities networks, detect strategic problems (those with a greater qualitative and quantitative impact on services and on costs), and formulate actions to rationalize resources use as well as to improve and increase production.

As a process, it uses its instrumental components (tables, indicators, etc.) to promote intelligence and managerial behavior compatible with paradigms for modernization of public management and sectoral reform. The premise is that, despite the limitations imposed by the first assertion of the potential of SIG, in its intervention areas it directly touches many of the fundamental problems of health services organization and management. Interaction with other tools --for programming, for quality assurance, for functional analysis and for performance evaluation-- both increases and complements its potential.

In its double nature as a tool and process, SIG has been broadly accepted thanks to its operational simplicity, low application cost, and great effectiveness in problems determining overall performance profiles of ambulatory and hospital units and of services networks at the local, regional or national level. It comes as no surprise that many

countries and institutions have successfully applied the Management Information System --in many cases that experience goes back several years-- and that it is currently in demand as a useful and necessary tool. Country demand and cooperation agency interest in SIG has been reiterated and increased, presenting the Pan American Health Organization not only with an opportunity but also with a long-term commitment.

## **2. PURPOSES**

Several aspects of SIG must be pointed out in order to understand its potential. First, it is more of a *managerial*, than an *administrative* tool. This is not a semantic distinction. It means that SIG places special emphasis on its applicability to strategies of management, overall planning, and organizational direction in the broad sense of the term, including, of course, resources management. Although some of its functions provide solutions to administrative processes such as billing. Accordingly, SIG concerns first of all those who have formal responsibility to wield institutional leadership at the highest level; from these, it permeates all levels of decision-making.

One of its chief purposes is institutional diagnosis, not as a bureaucratic process, but as a permanent, practical, and deliberate reading of the “alarms” or critical points that SIG provides. The possibility of rapidly visualizing a reduced, manageable set of problems determining the institutional productivity profile is one of the main strengths of SIG.

On the other hand, SIG includes a series of analytical tools that make it possible for the health services manager to “model intelligently” with cost/benefit options (cost involves efficiency and profit is reflected in coverage, quality and equity). One result of this type of analysis is that potential productive capacity can be quantified, compared with the “current” production. Non-utilized capacity can also be measured objectively (real productivity levels). This is a second purpose of SIG.

An understanding of relevant problems, associated causes, and possibilities for action make up the ingredients needed to formulate types and carry out goals for change. The characteristics of SIG --for example, using a limited number of indicators that affect the overall profile of organizational performance and the transparency of the relevant problems-- make it possible to establish processes of change directed to strengthen the relationship between Efficiency, Production, and Coverage. In other words, if the goals for change are met, there will be an efficient use of resources, which will produce greater relevance and an increase in production and ultimately a qualitative and quantitative improvement in coverage. A simple reading of the evolution of the indicators makes it possible to monitor fulfillment of the goals for change.

## **3. SIG APPLICATION AREA**

It is frequently and erroneously assumed that SIG is a methodology for hospital administration. Without detracting from its importance for hospitals, this is a restrictive

view of the potential of SIG. In order to correct this distortion, multiple applications of SIG inside and outside of the hospital area have been documented.

One of these examples presents the situation of a minister of health and his top management team who need to know the degree of success of the institutional network applying health services coverage policy. They would need to know the aggregate effect and the particular situation of some 400 institutions distributed throughout the length and breadth of the country, in seven regions and with the following levels of complexity:

- 10 national referral hospitals (tertiary level);
- 12 regional hospitals (secondary level, a few with some subspecialties);
- 15 hospitals of the first referral level;
- 300 ambulatory centers, with programs that reach into the communities themselves.

What would look like a monumental task, given the number of units, geographical dispersion, and data, becomes quite manageable using the possibilities that SIG provides for arranging data through systematic application. One immediate possibility is to prepare, for each level, the four tables explained below and to do a quick situation profile (production, performance, costs, relevant problems and productive potential). Information on the national health system is thus concentrated in four sets of four tables, each of which would encompass information on all the facilities and levels of the national health system.

But the contribution of SIG does not end here. Let us assume that the macro-analysis shows a profile of problems at each level of the hospital subsystem, in which the following stand out: (i) unproductive use of beds, reflected in low occupancy indexes and long stay levels per hospitalized patient; (ii) apparently excessive spending on drugs per discharge from medical and surgery services; (iii) high laboratory service use indexes by the surgery and medical services; and (iv) low medical resource performance levels in outpatient consultation.

The information the tables provide on these variables can be expanded in order to determine the individual behavior of institutions, programs, specialties and micro-variables, in such a way that the minister and his management team can provide a greater sense of direction to the processes of change, in order to improve the health system's coverage capacity.

The director or manager of any services network (for example a regional or area director) can perform a similar activity while the manager of the unit (hospital or ambulatory center) can do the same in his particular area of responsibility. SIG provides the highest level of detail in the latter case: it provides individual summaries for each service comprising the unit or facility, with the same contents drawn from the four previously mentioned tables.

#### **4. UTILIZATION OF SIG IN STATE MODERNIZATION AND SECTORAL REFORM**

Almost all countries are in the midst of sectoral reform processes. The fact that the majority currently accepts the *need for reform* suggests that there is some degree of consensus on the nature of the institutional crisis and an in-depth questioning of the organization, financing and operation models that prevailed in recent decades.

But if the crisis is real and has high social and human costs, something must be offered in the short term to attack its causes. Correcting the structural factors that condition the crisis is a task for the medium and long-term. SIG facilitates the immediate achievement of important institutional development processes that are compatible with medium and long-term reform goals. The very nature of SIG sustains this effort:

- It can be implemented very quickly, both in individual units and in networks or health systems.
- Its operating costs, both in terms of procedures and of resources, are minimal and within the means of all the countries.
- Information on SIG is easy interpretable by the health services managers: physicians, nurses, engineers, biochemists and many others who engage in management but come from diverse professional and disciplinary sectors.
- Easy use of the information (and analytical processes) contrasts with its high effectiveness in the processes of change.

How should the process of change be conducted? The starting premise is that improving institutional efficiency is one of the chief objectives of projects for modernization and reform, and a necessary condition for increasing the equity, effectiveness, quality, and sustainability of health systems. In this context, utilization of SIG can be summarized as follows:

- Political and top management decision-making levels can conduct a macro institutional analysis, identify strategic problems that condition the efficiency profile, determine its causes, and propose possible solutions. Based on this analysis, the political leadership assumes a steering role, which is strengthened by a thorough understanding of the strategic situation and the ability to initiate a constructive dialogue with other decision-making levels.
- Management of the different service networks (provincial or regional) poses a similar task (analysis of aggregate information in its own area of authority). The results of this analysis can validate, modify or change the vision that policy-setting levels have on problems, causes, and possibilities for corrective action. Once again, initiative and leadership are strengthened at this level.

- Health systems at the local level conduct their own analysis and again validate, modify, or change the next higher level's vision of the problems, causes, and corrective actions. Initiative and the responsibility are, once again, transferred to the local level.

The capability that SIG has for aggregating information that originates at local levels makes it possible to have monitoring systems at each level (management indicators) whose evolution verifies the success of the change process (variations in the structure of supply, production volumes, performance levels, services cost, etc.).

This process has special characteristics that are worth emphasizing. First, the participatory nature of managing changes at each level of the organization of the services system, as well as internally between institutional components at every level.

Secondly, through ordering, articulation, and harmonization of the process of change, arising from dialogue between these levels.

Thirdly, because the results of any process of change can be quantitatively verifiable. *In order to make adequate use of aggregate resources, the reduction of the gap between "current" production and potential production becomes a powerful social productivity indicator and a test of sector capacity.* On an operational plane, it is possible to see variations in the volume of services production, structure, performance, patterns of resources use (composition, distribution, etc.) and costs.

Fourthly, the situation profiles usually provide possibilities for high impact action with the available resources. Following the principle of problem ranking, it is possible to target efforts and resources on a limited number of problems with a high qualitative and quantitative impact on the delivery of services and on operational costs.

Finally, the analytical process in the Management Information System can help improve most training efforts, which are disjointed and lack direction. These quite often respond to the special interests of professional and technical groups and prioritize specific training areas. Thus, their normative contents are in a vacuum as soon as they are faced with an operational capacity that falls short when conducting a more comprehensive managerial process; they follow centralized organization modalities, alien to the local context and focused not on problem-solving but rather on information delivery, through analysis of a few factors that determine operating capacity. Managerial training begins with a quantification of the coverage levels through SIG (characterized by areas of activity or programs, in accordance with the opening of services) and their relation to the "real" production of health services. Thus the potential capacity for service production is determined according to reasonable and accessible premises of efficiency and quality. The difference between productive capacity and "real" production provides a powerful indicator of the possible presence of a substantive problem (inefficiency or nonutilized capacity), that can lead to practical actions for change, including training. The analytical process concludes with a search for the roots of the problem in organizational factors or use of resources that negatively affects productive capacity and thus coverage. This analytical modality, conducted in the local area and in a decentralized and participatory

form, makes it possible to establish institutional development goals and generate elements of directionality which are frequently absent in traditional training programs.

These are some of the main concerns that shaped development of the new version of the Management Information System: WinSIG.

## **5. AN OVERVIEW OF WinSIG**

WinSIG generally preserves the basic characteristics of previous versions of the Management Information System, particularly its easy use by personnel with no previous training in computers; but it incorporates other modules that were not part of SIG 2.0 and SIG 3.0.

The main functions of WinSIG are the same as those, which SIG has had from the start:

- Comprehensively evaluate performance of health institutions and programs.
- Identify factors or most relevant problems of the relevant institutional productivity profile.
- Facilitate analysis of these factors or problems in order to determine options for change, within the framework of the sectoral reform process and modernization of health administration.
- Monitor the processes of change and assess impact of institutional adjustment measures adopted to address problems that SIG itself makes it possible to identify.
- Establish the costs of services in terms of productivity functions.

In order to fulfill these functions, the WinSIG program provides managers with the following products:

- Up-to-date monthly information for management, including *managerial tables, management indicators and trends*. As a new feature, WinSIG provides a set of *indicators for results monitoring*, when these feature in *management agreements*. These indicators quantify coverage, production, resources, performance, and costs.
- A module for processing *structure of morbidity seen*, following the International Classification of Diseases (ICD-10); this places special importance on the problem-solving capacity of the services network.
- A module for design of *treatment protocols* as an auxiliary element for quality assurance programs, linked to the structure of morbidity and the inputs and procedures programming systems.

- A *programming and budgeting* tool, based on an analysis of the institutional capacity and treatment protocols, that provide more solid options to set production goals and the requirements of therapeutic, diagnostic and other procedures, and of essential supplies.
- A mechanism for *costing of treatments*, additional to conventional average costs -- total and unitary costs--, that includes two modalities: *presumptive cost*, stemming from the treatment protocols by related diagnoses group and *current cost*, either per patient or per procedure, facilitating individual collections or interinstitutional billing for services. – *WinSIG offers to the user at least 12 forms of billing, so the desirable form of billing can be selected* -.
- Schemes for *evaluation of the productivity* and institutional *efficiency analysis*, upon comparison of results against programmed activities, services rendered with protocols, actual costs against presumed costs, real production capacity against potential capacity.
- A mechanism to form and compare Diagnostic Related Groups (DRGs) based on the costs of protocolized care and the actual costs of the care given.
- An on-screen consultation system to define, formulate, and interpret indicators (conditioning factors, implications, etc.) that SIG uses in the institutional management process, as well as the contents of the defined treatment protocols.

The program now allows for “on-screen consultation” of the information used and its products, not just as tables and indicators, but also as narratives. The report formats are flexible and largely determined by the user. It has been designed to allow for decentralized local operation and development of indicator systems or management monitors, in support of the regulatory functions corresponding to a given level of health services systems administration. Its application requires the exercise of good judgment; those responsible for defining parameters common to all programs or facilities should allow room for reasonable deviations which might arise as a result of regional and local initiatives. In the definition and arrangement of the system parameters (especially inputs and human resources categories) the user should be reminded of the managerial purposes of SIG and not reduce them to accounting or fiscal criteria, which are more or less alien to its purposes.

## **6. WinSIG PRODUCTS**

WinSIG provides a variety of possibilities, including some products of special importance, as mentioned below:

### **6.1 Management Tables:**

**Table 1:** provides comprehensive information on “productive centers” (or services) that make up the institution or network of institutions; total operating costs; unitary costs; and

hospital bed performance if the institution is a hospital. This table provides the manager and other interested parties an overall view of the results of the productive process.

**Table 2:** defines levels of complementary services usage (for example: operating rooms, laboratories, maintenance services, administration, etc.) that are a comprehensive part of the principal product of the organization (for example consultations). In order to appreciate the importance of the indexes registered in this table, it should be noted that in secondary and tertiary care level hospitals, complementary services usually absorb over 50% of total operating costs.

**Table 3:** provides information on human resources availability and performance, and composition and distribution patterns.

**Table 4:** details the composition of the operating costs of the facility or network and of each component service or “productive center”. This table is essential to analyze production functions (composition and amount of inputs associated with a given volume of production) and to advance cost/equity and cost/effectiveness options.

## **6.2 Historical Series:**

These make it possible to understand the historical behavior of a variety of indicators. For example, based on SIG, production for any period can be analyzed in order to plan for possible cyclic variations in demand.

## **6.3 Management Indicators:**

These make it possible to know and compare the behavior of a variety of indicators within a given time period (for example, what was the occupancy rate in September of the previous year). Unlike the historical series, the indicator is a specific datum for a given period established by the user for one or more production centers.

## **6.4 Program/Budget Preparation and Negotiation:**

The methodology implicit in this version seeks to incorporate institutional analysis as a means to identify problems and introduce corrective measures in the programming and budgeting process in order to optimize the use of resources. The analytical process stems from substantive production (for example discharges or consultations), subsidiary production (for example laboratory examinations or meals), and the allocation of resources by unit of production (for example anticipated drug expenditures per pediatric discharge). The computer program does the math. As a result of this process every unit prepares a proposal that includes production under certain premises of efficiency and quality, resources required to that end, and the corresponding costs (ratio of product/input). Note here *the linkage between the tool and the process*. The process tries to promote a new form of managerial behavior, through analyses of options that provide

better cost/equity and cost/effectiveness ratios than current historically projected resource allocation formats. Furthermore, the adoption of uniform criteria for resources allocation (targeted to optimization of the production of every service or facility) seeks to neutralize the distorting effect of special interest groups on the resources structure. It is the basis for design and negotiation of management agreements.

An additional programming function has been added based on established treatment protocols and complementary formats to the programming methodology that supports the System, which seek to mold the *programming and budgetary commitment* into a summarized, simple format. With this managers have a permanent reference tool in their dialogue with the authorities responsible for allocating resources and with the working teams.

## **6.5 Evaluation of Results:**

The last component to point out is the capability, given certain standards or commitments, to monitor the degree of fulfillment of a program or management agreement. WinSIG makes it possible to register the standard, and then extract the corresponding indicator to determine its level of application. Management parameters are a key element in the promotion of new forms of managerial behavior; they are a type of quantitative control that makes it possible to cast management as a function of product and results, and to avoid uncertain environments that generate waste, friction, and conflict. In the absence of pertinent standards --a frequent deficiency of health services-- the information that WinSIG generates and arranges makes it possible to get a sense of trends, and thus establish indicative values as a temporary substitute for standards.

## **6.6 Cost Analysis:**

The sectoral reform process has generated new pressures to refine service costing procedures, especially in hospitals; that is why WinSIG has included new procedures for Services Costing.

Hospital costs certainly constitute one of the main factors of expenditure of the sector, not necessarily proportional to its contribution in the improvement of health of the population. In that sense they are also an essential conditioning factor of financing health in general and of the possibility of expansion of programs and its coverage that could have a more favorable cost-benefit ratio in health expenditures. Cost analysis is a way of promoting the improvement of health services, not only in terms of efficiency but also effectiveness and equity (managerial approach). The cost of a service is in fact a reflection of the quality of care. The direct cost of discharge or an out-patient visit reflects the resources used in the treatment of a patient; and the indirect cost reflects the diagnosis and therapeutic procedures, and other procedures associated with that treatment; thus, both reflect the quality of care.

On the other hand, the comparative analysis offers elements that, under comparable conditions, allows to determine the type of treatment that is offered to a community with respect to another. In that sense, a higher cost in a facility implies that there has been a conscious or unconscious decision to assign greater number of resources than in others of similar level of complexity and characteristics of demand. The deviations, when they are substantial, constitute consequently a possible measure of equity in the distribution resources.

Thus, it is important to define the cost objectives, in order to establish which method has the best cost/profit ratios. This last aspect is critical. The selective operation of costing systems implies the ability to select, from a broad universe of possibilities, applications that are pertinent to the purposes and real possibilities of each institution. In general it is considered that the costs average offered by SIG in all its versions achieves the purpose of institutional rationalization; presumptive costs may be used to regulate inter-institutional service purchase relationships; and finally, costing by patient or by procedure facilitates individual services purchasing relationships.

It would seem sensible that when service purchase/sale relationships among institutions or with individuals exist, costing should have a high level of precision, although this implies additional expense and yet one more administrative burden on the fragile operating capacity of health systems and institutions. For this reason, and owing to the need to develop more precise processes to serve the purchase/sale relationships, WinSIG provides a patient care costing option that is both precise and inexpensive to apply. It entails, on the one hand, recording procedures and inputs (personnel and materials) that the patient has received in the course of treatment and associating them with one of the cost tables that SIG updates on permanent bases without additional calculating efforts.

WinSIG also provides the option of establishing presumptive costs (standardized) by type of pathology or groups of related diagnoses, provided that the inputs and procedures components have been previously defined by means of the protocols module. This option appears reasonable when the service purchase/sale relationship is of an institutional type. The contracting party can agree with the supplier on a presumptive price, established by mutual agreement -management agreements- and based on a scientific definition of care processes --main purpose of the protocols-- and on a consensus on performance criteria --main purpose of the parameters and indicators of efficiency.

## **6.7 Information on Morbidity Seen:**

The Morbidity component has a variety of important applications in health management and is related to several of SIG functions. Mainly, morbidity constitutes the starting point of the protocols.

WinSIG has incorporated a table with the 10th International Classification of Diseases of the World Health Organization.

It permits the data entry of morbidity seen during a period given, in order to create the structure of the attention in the specific services of a facility.

## **6.8. Billing:**

The information that WinSIG processes for the cost-patient billing contains at least two essential elements. First, the profile of the patient clinical treatment, that is: the diagnosis and the procedures and inputs required by the patient care, and the cost of care. Second, the institution or company that could be billed for the total or partial cost - in relation to agreements for the purchase of medical services with the provider. It can also generate the costs in relation to a Diagnostic Related Group (DRG) to which the morbidity related to the patient seen belongs.

In relation to these elements and when the circumstances warrant it, WinSIG can generate up to twelve types of reports on individual cost by patient seen and by institution or company of patient origin, to whom supposedly the cost of the treatment, total or partial, should be billed.

## **6.9 Preparation and comparison of Diagnostic Related Groups:**

This new option makes it possible to generate the DRGs lists defined in the facility. Two different types of lists can be generated: Individual Reports (it includes the list of related morbidities, the direct and indirect cost of the DRG, and the total DRG cost) and General Reports (the list of morbidities included and the total DRG cost).

## **7. STRUCTURE OF THE WinSIG PROGRAM**

The main menu preserves the same structure, with the following components:

- Configuration
- Data
- Results
- Analysis
- Utilities

The three versions of SIG provide a *Configuration* module with the same basic characteristics, the most important of which is the capability of adding data all the way from a smaller activity or subspecialty up to the service, the facility, a local or regional network, or a national health system. This capacity for aggregation goes hand-in-hand with the concept of a *services network*, a common factor in health system development in the past and that, without a doubt, will remain important in the future. The possibility of offering an integrated vision at the level of the health organization as a whole, in order to facilitate the analysis of problems with broad impact and the adoption of corrective measures, is a strategic contribution to the process of change facing the countries of the Region.

The *Data* module has changed slightly. Some important changes were made to register data required by the new modules added to WinSIG (protocols, Diagnostic Related Groups and cost per procedure and patient); these are explained below.

Three components appear under the label of Protocols: inputs, human resources, and procedures. Protocols are in fact a broader item, but WinSIG focuses only on their application to the programming process and the promotion of clinical excellence—supporting the quality assurance process through a mechanism to link standards to patterns of care.

The Protocols module provides a simple and transparent mechanism, which the user can define, at his/her own choosing and in keeping with his/her own perception of priorities, the inputs, human resources, and procedures required for effective treatment of each type of morbidity. Given these devolved capabilities, WinSIG 1.0 also allows for evidence-based definitions to be established and defined in more or less centralized form.

Closely allied to the above, WinSIG also includes a program to process the morbidity structure according to user-defined formats and intensity. This has been a deficiency of previous versions, frequently aggravated by a lack of appropriate and flexible means to process the data and obtain results in a timely fashion for decision-making. WinSIG satisfies this need to relate production to morbidity seen. Thus, productive capacity can now be associated with the morbidity structure, so that output is programmed not only by final activity, but also by pathology type. By associating it with protocols it becomes possible to define resources (personnel and material) and procedures with a high degree of rationality.

It is advisable to point out that these new attributes of WinSIG have been designed to provide the *highest desirable level of local participation and the essential minimum of central regulation*, consistent with the decentralization policies common in sectoral reform and the modernization of public administration. It is understood that countries can opt to establish nationally applied indicative standards, which would allow for some process of regional and local validation. On the other hand, the ability to update standards based on experience and local reality is rarely achieved, given the rigidity of the respective manuals. With WinSIG it is possible to copy the pertinent information in the relevant module, and to facilitate updates by people in daily contact with the patient at the regional and local level. This has two important consequences: firstly, it is not necessary to publish a manual of pertinent standards. These are available "on-screen". Secondly, the local user can access a simple operational mechanism for updates determined by his/her own experiences and realities. The ministries and social security institutes are furthermore spared the expensive and ineffective process of printing manuals. These changes can be systematically assembled (for example through a copy of the relevant file) in order to keep national standards up-to-date and distribute them to appropriate users via diskette.

The *Results* module also preserves attributes of the older versions, while adding some new elements. Three essential products merit attention: Tables, Indicators, and Historical Series preserve the basic characteristics of previous versions. An option has been added

to print or consult a set of basic indicators on-screen, which can be generated in letter format with one keystroke. This modification seeks to facilitate the dissemination of information on a set of critical indicators, so that they are available in a timely fashion for managers at the national, regional, and local level.

The most important changes are related to the *Analysis* module, especially in program/budget preparation (management agreement) and in the use of certain tools that serve a dual administrative and clinical purpose.

## **7.1 Configuration Module**

The configuration module determines:

- Characteristics of a facility or program. The concept of facility or program is used flexibly; in this regard it is advisable to point out that WinSIG in its different versions has been designed for health programs and not exclusively for hospitals, although given their share in sector resources, these are of enormous importance.
- The configuration menu tries to characterize these programs or facilities in two general senses. First, based on variables used by the Management Information System, that is, input categories expressed in monetary terms, production, and human resource hours, all associated to a structure of services (cost centers in the conventional terminology). Secondly, in terms of its location within a health services system and in a given geographical and population context. Each program or facility has a specific relationship with a defined population area and is inserted in a service network based on its level of institutional complexity and the functions it shares with other programs or facilities. In this way coverage indicators can be achieved (production of services on population) and added to the information in order to facilitate the institutional macro analysis. This function is essential to direct the process of change in the light of reform or sectoral modernization. The services network concept is a function of economies of scale and is an essential requirement for application of principles of equity, effectiveness, and efficiency. Its principal components are described below:
- Organization of the System: places the facility or programs in a local, regional and national network of health services. It permits setting up tables and aggregate indicators at each level of the services network. The possibilities for data aggregation range from a specialty, a service, a facility or program, up to a local, regional, or national health system.

- **Institutional Levels:** identifies the level of institutional complexity of each facility or program, which in turn is determined by the resource and technology configuration. The underlying premise of the complexity levels is role diversification and the management of resources and technology on a basis of equity, effectiveness, and efficiency. The arrangement of the contribution of each component of the services system and coordination among them depends to a great extent on how this concept is applied. From the standpoint of the user the referral system constitutes an essential component of this arrangement.
- **Human Resources:** this facilitates the classification of a limited number of human resources categories that make up the “productive equipment” of each service or cost center. It uses the concept of “Nuclear Resource”, that is, the resource around which working team revolves, (for example, the physician in medical care, the pharmacist in management of the pharmacy, the biochemist in the clinical laboratory, etc.). This makes it possible to obtain better personnel distribution and composition indicators. It should be noted that the Nuclear Resource is not necessarily associated with hierarchy nor authority.
- **Inputs Categories:** this establishes a limited number of categories, usually between 20 and 30, of inputs utilized in the services production process and which determine the cost of the latter. In general, the system works with three main categories: personal services, inputs, and non-personal services, although the user can determine classification, desegregation, and ordering. For certain programming and budget functions the categories should be ordered according to their relative importance in the cost of services; likewise for the management agreements indicators, and in order to facilitate their use by managers. In general it is considered important to limit the application of accountancy or fiscal ordering criteria.
- **Classes of Services:** these are service associations, grouped according to their similarities in order to apply parallel criteria in the analysis. This also makes it possible to single out services such as intensive care units that, as supporting elements (that do not generate discharges) share indicators with the direct patient services (for instance occupancy index, average length of stay, turnover rate and substitution interval).
- **Services:** this defines the programming structure of the unit concerned. A service should have a quantifiable unit of production and clearly recognizable resources; this need not imply excessive data processing costs.

## **7.2. DATA MODULE**

As the name suggests, this module permits the capture and processing of data required by other components of WinSIG. The principal function is data entry and editing, although the latter can serve as basic working tools in their own right, as, for instance, when the data list is used for budgetary purposes. In addition, it contains a program for processing

morbidity structures, protocols, auxiliary programming and budget formats, and a new procedure for costing by patient. These principal components are described below:

- **Monthly Input:** opens a spreadsheet with the program or facility characteristics so that data for the corresponding month may be entered.
- **Data Matrix:** makes it possible to generate matrixes, with or without data, to enter or confirm correction of data or for other programming, budgetary or financial purposes.
- **Forms:** provides some auxiliary formats for data collection in order to prevent difficulties with the design and printing of special forms. Many years of experience with WinSIG suggested the desirability of continuing with the current formats and using auxiliary formats only exceptionally and with the agreement of each responsible unit party and technicians.
- **Indicators:** provides assistance on indicators used by the System. Thus when in doubt the user may go to this component of the menu, open it, and make pertinent queries. It can also edit or change, or delete information initially entered, or add new indicators. For each indicator the following is offered:
  - Name of indicator
  - Description
  - Formula
  - Location of indicator
  - Behavior conditioning factors
  - Analysis and Implications
- **Morbidity:** permits data entry in order to determine the structure of morbidity seen in the corresponding periods. Constitutes an essential, yet largely ignored, element of health facilities management. It is closely linked to the protocols and the program/budget.
- **Procedures, Essential Supplies, and Units:** permits entry of definitions, criteria, and measures of usage of the procedures and inputs to be included in the protocols.
- **Protocols:** based on the morbidity structure, makes it possible to define essential supplies (for example drugs and medical/surgical material) and procedures (for example type of surgical intervention and laboratory examinations) by specific morbidity. It is essential to achieve good input programming and service production goals; furthermore, it facilitates development of the quality assurance process, through a comparison between standards and results, and conducting of service training programs.
- **Financing:** it incorporates into a low-cost process, the monetary value of all procedures, as well as the supplies and procedures related to the user of the health services. It also makes it possible to register the entities from where the patients come and to whom it would be necessary to bill for the care provided.

- **DRG:** it permits the grouping and the presumptive financing of the treatment of the related diagnostics.

### 7.3 Results Module

The results are the chief output of the program. The traditional SIG tables are to be noted: the first provides general information on the services structure of every unit, the production unit defined for each, production, the cost of service operation, unitary cost and some indicators of specific or general performance. The second provides information on diagnostic performance, therapeutic support services, administration, and general information, including production for the period and usage indexes per unit of final service production. The third refers to the patterns of human resources supply, distribution, composition, and productivity. Table 3 A is for direct patient services; 3 B is for complementary services. The fourth table has direct and indirect costs for each service and for the unit as a whole. The indicators and the historical series round out these tables, along with their respective graphing options. The chief components are described below:

- **Management Tables:** generates the four WinSIG tables, according to a user-defined format, which can be consulted “on screen” or as printouts. There are three optional formats: general, consisting of comprehensive spreadsheets with all the services; general with services “flagged” by the user; and individual, with data for the four tables for each service.
- **Historical Series:** generates trend indicators over user-defined periods.
- **Management Indicators:** generates indicators for a given period. There is an option to generate a set of indicators that each country might consider appropriate to publish on a periodical and routine basis. (please refer to the attached Annex)
- **Morbidity Seen:** generates reports on morbidity seen in absolute and relative numbers, in alphabetical format, by code and by frequency, ascending or descending, and service or facility.
- **Billing:** It also includes two additional financing elements: one presumptive that emanates from the treatment protocols and another current by patient or procedure, that results from processing the expenditures that were incurred.
- **Report of Diagnostics Related Groups:** it makes possible to generate the lists of Diagnostics Related Groups defined for each service, including the detail about the diseases that are included in each DRG. The costs are presented in range of Minimum, Maximum, and Average, in relation to the length of stay (minimum and maximum) defined for each morbidity.

## 7.4 Analysis Module

Although it might appear as if this module has the same contents as SIG 3.0, there are important underlying changes. The main change is that if an institution wants to devote a more serious effort to programming of inputs and procedures (support services production), these can be premised on the use of protocols, morbidity structure, and production goals. The chief components are described below:

- **Parameters:** these make it possible to register standard values, or values set by a unit or program as their goal for a given period in terms of coverage, performance standards, and services utilization. It should be noted that the implicit purpose is to promote the design of standards with a local character and not necessarily defined and imposed from central levels. Obviously, certain standards should be the outcome of a negotiation process between system levels, but the presumption of a universal standard for different regional or local contexts usually turns out to be inappropriate and the product of a centralizing approach which the new management models seek to overcome. The standards include coverage, hospital bed utilization indexes, complementary services use rates per final production unit, and human resources productivity.
- **Program/Budget:** its premises are the need for institutional analysis, and that the program/budget be constituted as a commitment to improvement, and therefore to decisions regarding the reorganization of programs and resources. It derives from coverage, the production that such coverage entails, necessary resources, costs under predetermined equity parameters (relative distribution of resources), effectiveness (structure of programs and resources), and efficiency (resource performance). The indicators essential to *management agreements* derive from the program/budget, as well as that necessary for control by results, and generally speaking for decentralized management. It allows for incorporation of input programming and protocols-based procedures.
- **Control by Results:** constitute reports from the program/budget, relative to *goals* and *results* in terms of coverage, production, performance indicators and resource use. The figures are expressed as indexes of the deviation of results with reference to goals, in such a way that quantitative (and some qualitative) elements of institutional performance are available at all times. Local information is integrated in the *accounting* process, while its integration at higher levels permits the facility of *management monitors by results or products*.
- **Productivity Evaluation:** makes it possible to compare the efficiency levels of a unit or set of units with reference to predefined standards or programming criteria.
- **Efficiency Analysis:** allows for the identification of the unutilized capacity by comparing the real production against the potential production capacity, under certain performance parameters of the resources and establishing areas of intervention to recuperate the unutilized capacity.

- **Presumptive Cost of Care:** it makes it possible to generate reports on cost-morbidity in function with the use of supplies, procedures and average stay defined in the respective protocol for a specific service. It represents the “reasonable cost” of care by morbidity in relation to the standard (protocol) for a given period. This cost is presented in the menu of results as a billing option.
- **Diagnostics Related Groups Comparison:** it makes it possible to compare (for a period of time defined) the cost of the DRGs with the actual the patient cost and compare with the specific cost of every morbidity–presumptive cost or cost for protocol-.

## 7.5 System Maintenance

Under the Utilities menu WinSIG has the same contents that SIG 3.0 had, with the sole exception of the *Change Categories Code* component, whose function relates to the generation of management indicators by results. It contains auxiliary processes for program maintenance. The chief components are described below:

- **Data Backup:** makes it possible to keep data from a given period on floppy diskettes, with two main purposes: to keep backup copies in case of accidental loss of information, and to transfer the information in order to generate tables and aggregate indicators in local regional, or national networks.
- **Backup Recovery:** makes it possible to recover data saved on a diskette, in case of accidental loss or in order to add data to services networks.
- **Users Maintenance:** it makes it possible to establish passwords for different levels of users of the program and maintain a registry of users in each defined category. The Program allows for four levels of user: Supervisor who has unrestricted access to the program and establishes the codes and national application standards; Person in Charge has the ability to characterize a facility; Consultant who has the ability to generate tables and indicators; consult and print them; and Data Entry who can enter data, but not change the variables that characterize the facility or program.
- **Equivalencies:** It makes it possible to standardize the definitions of codes of the different settings of the application of the system for purposes of preparation, consolidation, and indicator comparison.
- **Transfer:** it allows the user to import the basic data matrix processed with SIG version 3.0, to be processed by WinSIG. It is especially useful when the two versions are being utilized in parallel within a single health system, in order to consolidate the information and not lose historical series.
- **Distribution of Codes:** it allows the reproduction of the Program with the standardized configuration codes for its distribution and installation in the different facilities or units within a single system or health institution.

- **Language Selection:** it allows the selection of one of the five languages in which the Program operates. The Program can be operated in Spanish, English, French, Portuguese, and Dutch. The ICD-10 is also available in these languages.
- **Translator:** it is an auxiliary program that permits the translation of the Program into other romance languages. This option is carried out outside the WinSIG Program.
- **Interface:** it is an auxiliary program that guides the development of interface programs that allow the retrieval of basic data from existing institutional information systems and the automatic entry of these data in the system. This option is carried out outside the WinSIG Program.

## 7.6 Help

It contains the Program Operating Manual that can be accessed directly on screen or printed. This Manual contains the technical orientations for the implementation and utilization of the system and Annexes with information on specific subjects that require greater illustration.

## 7.7 Application Process and Operational Requirements

WinSIG can be applied to any type of facility or health services network, to the degree that it has products and quantifiable resources. It requires the following conditions and processes in order to deploy its full array of options and potential:

- **Application of WinSIG:** requires prior definition and coding of the system variables. It is possible to conduct individual applications at the level of a unit or facility, without the coding of variables by a central authority; this frequently is done for demonstration purposes and in order to encourage broader usage. However, in order to aggregate information and create a national management indicators system the universe of codes must first be defined by a central authority.
- **Characterization of a facility or unit:** requires that all previous variables be defined and coded through the Configuration module.
- **Reproduction of the basic data matrix:** The empty matrix, for purposes of arranging the information, requires that the facility be previously defined and characterized. The data-bearing matrix requires at least one month of information.
- **Generate tables:** requires at least one month of information.
- **Generate indicators:** requires at least one month of information.
- **Generate historical series:** requires at least two months of information.
- **Use of auxiliary programming and budget tools:** is facilitated if one full year of information is used, or if existing information is annualized.

- **Productivity evaluation:** requires prior definition of performance and usage parameters or standards.
- **Protocol design:** requires prior definition of the following tables:
  - ◆ Morbidity (including the ICD-10).
  - ◆ Diagnostic, therapeutic, and related procedures.
  - ◆ Inputs (personnel, drugs, surgical material, etc.)
  - ◆ Average Days Stay per pathology
- **Morbidity structure:** requires creation of the morbidity table and incorporation of data for the corresponding period. The International Classification of Diseases (ICD-10) is built into WinSIG.
- **Control by Results Indicators:** requires that the program-budget include the auxiliary programming list contained in WinSIG.
- **Average Costs:** arises from the normal operation of WinSIG and the above mentioned tables.
- **Presumptive Costs:** arises from application of the protocols, and involves the same requirements, as well as definition of days stay by pathology.
- **Current Cost (Patient or Procedure)** has the following requirements:
  - ◆ Operating costs (the system processes these).
  - ◆ Procedures tables for the respective services.
  - ◆ Procedures production for the respective period (registered from the clinical histories).
  - ◆ Definition of the procedure tables weightings.
  - ◆ Material input tables with up-to-date costs.

## 8. COMPUTER REQUIREMENTS

The WinSIG program must be installed, for stand-alone or LAN, on the hard drive of an IBM-compatible computer, with the Windows 95 operating system or higher, Microsoft Office 97 or higher, and with 64 MB of RAM and a parallel port printing option. In order to obtain reasonably efficient execution times a processing speed of 100 MHz or higher and a computer processor Pentium II or higher are recommended.

Installation of the program requires a minimum of 120 MB of free space on the hard drive and additional disk space for the databases, which will expand as the system is used.

## 9. ACCESS TO WinSIG

The Management Information System, its WinSIG computer program (for installation and operation in the five languages used in the Region of the Americas) and supporting technical documentation are available to health sector public institutions in the Region of

the Americas through the Pan American Health Organization's technical cooperation programs with the countries.

Interested parties can obtain access to WinSIG by requesting such cooperation from the PAHO/WHO Representative Offices in the respective country, or from PAHO/WHO Headquarters at the following addresses:

Pan American Health Organization  
HSP/HSO  
525 Twenty-third Street, N.W.  
Washington, DC 20037-2895

**Email:** [winsig@paho.org](mailto:winsig@paho.org)



## ANNEX

### MANAGEMENT INDICATORS GENERATED BY WinSIG

The indicators described next can be obtained (when the pertinent data is available) in letter or legal sized automatically when the user selects the “Print Indicators” option of the “Results” main menu.

INDICATORS IN STANDARD FORMAT GENERATED BY WinSIG		
I INPATIENT SERVICES	II OUTPATIENT SERVICES	III COMPLEMENTARY SERVICES
1. Discharges	57. Consultations	99. Cost of Service as a Proportion of Total Cost (% Direct Costs)
2. Concentration Index	58. Concentration Index	100. Per Capita Cost
3. Occupational Index	59. Structure of Services Supply	101. Output
4. Average Days Stay	60. Intensive Care Transfers per Consultation	102. Index of Utilization by Type of Service
5. Turnover Rate	61. Special Care Transfers per Consultation	103. Pivotal Resource of the Service
6. Substitution Interval	62. Surgical Interventions per Consultation	104. Pivotal Resource Hours per Output Unit
7. Number of Beds	63. Treatment of Physiology/Physiatrics per Consultation	105. Nurse Hours per Output Unit
8. Structure of the Service Supply	64. Clinical Laboratory Examinations per Consultation	106. Other Professional Hours per 1 Pivotal Resource Hour
9. Intensive Care Transfers by Discharge	65. X-ray Studies per Consultation	107. Auxiliary Nursing Hours per 1 Hour Pivotal Resource
10. Special Care Transfers by Discharge	66. Sonographies per Consultation	108. Qualified Technician Hours per 1 Hour Pivotal Resource
11. Surgical Interventions by Discharge	67. Electroencephalographies per Consultation	109. Total Staff Hours per Output Unit
12. Treatment of Physiology/Physiatrics by Discharge		
13. Clinical Laboratory Examinations by Discharge		

14.	X-ray exams by Discharge	68.	Electrocardiographies per Consultation	110.	Pivotal Resource Hours per 1,000 Population
15.	Sonographies by Discharge	69.	Blood Transfusions per Consultation	111.	Nurse Hours per 1,000 Population
16.	Electroencephalographies by Discharge	70.	Prescriptions per Consultation	112.	Nursing Auxiliary Hours per 1,000 Population
17.	Electrocardiographies by Discharge	71.	Physician Hours per Consultation	113.	Technician Hours per 1,000 Population
18.	Blood Transfusions by Discharge	72.	Nurse Hours per Consultation	114.	Total Staff Hours per 1,000 population
19.	Prescriptions by Discharge	73.	Nursing Auxiliary Hours per Consultation		<b>COSTS</b>
20.	Rations per Bed-day Occupied	74.	Total Staff Hours per Consultation	115.	Total Service Cost
21.	Kilograms of Clothes Washed per Bed-day Occupied	75.	Nurse Hours per 1 Physician Hour	116.	Unitary Cost per Output Unit
22.	Physician Hours per Bed-day Occupied	76.	Nursing Auxiliary Hours per 1 Physician Hour	117.	Total Direct Service Cost (in percent)
23.	Nurse Hours per Bed-day Occupied	77.	Other Staff Categories Hours per 1 Physician Hour	118.	Total Indirect Service Cost (in percent)
24.	Nursing Auxiliary Hours per Bed-day Occupied	78.	Physician Hours Contracted	119.	Total Cost in Staff Services
25.	Total Staff Hours per Bed-day Occupied	79.	Nurse Hours Contracted	120.	Total Cost in Material Inputs
26.	Physician Hours per Discharge	80.	Nursing Auxiliary Hours Contracted	121.	Cost in Drugs per Output Unit
27.	Nurse Hours per Discharge	81.	Other Staff Categories Hours Contracted	122.	Total Cost in Surgical Material
28.	Nursing Auxiliary Hours per Discharge	82.	Physician Hours per 1,000 Population	123.	First Material Input of Highest Relative Weight in the Direct Cost (%)

29.	Total Staff Hours per Discharge	83.	Nurse Hours per 1,000 Population	124.	Second Material Input of Highest Relative Weight in the Direct Cost
30.	Nurse Hours per 1 Physician Hour	84.	Nursing Auxiliary Hours per 1,000 Population	125.	First Service of Highest Relative Cost With Regard to the Total Indirect Cost
31.	Nursing Auxiliary Hours per 1 Physician Hour	85.	Total Staff Hours per 1,000 population	126.	Second Service of Highest Relative Cost With Regard to the Total Indirect Cost
32.	Other Staff Categories Hours per 1 Physician Hour	<b>COSTS</b>		127.	Third Service of Highest Relative Cost With Regard to the Total Indirect Cost
33.	Physician Hours Contracted	86.	Total Service Cost	128.	Service Cost as Proportion of the Total Cost (% Costs Direct)
34.	Nurse Hours Contracted	87.	Unitary Cost of the Consultation	129.	Per Capita Cost
35.	Nursing Auxiliary Hours Contracted	88.	Total Direct Service Cost (in percent)		
36.	Other Staff Categories Hours Contracted	89.	Total Indirect Service Cost (in percent)		
37.	Physician Hours per 1,000 Population	90.	Total Cost in Staff Services		
38.	Nurse Hours per 1,000 Population	91.	Total Cost in Material Inputs		
39.	Nursing Auxiliary Hours per 1,000 Population	92.	Total Cost in Drugs per Consultation	□	<b>Notes on the complementary services:</b>
40.	Other Staff Categories Hours per 1,000 Population	93.	Total Cost in Surgical Material per Consultation	a)	The breakouts also feature the type of Pivotal Resource, for example Physician, Biochemical, etc.
	<b>COSTS</b>	94.	First Material Input of Highest Relative Weight in the Direct Cost (%)	b)	The Output Unit is also explicitly differentiated, for example: Surgical Intervention, Laboratory Examination, etc. (as opposed to the generic expression “unit of output”).
41.	Total Service Cost	95.	Second Material Input of Highest Relative Weight in the Direct Cost		
42.	Unitary Cost of the Discharge	96.	First Service of		

43.	Total Direct Service Cost (in percentages)		Highest Relative Cost With Regard to the Total Indirect Cost
44.	Total Indirect Service Cost (in percent)	97.	Second Service of Highest Relative Cost With Regard to the Total Indirect Cost
45.	Total Cost in Staff Services		
46.	Total Cost in Material Inputs	98.	Third Service of Highest Relative Cost With Regard to the Total Indirect Cost
47.	Total Cost in Drugs		
48.	Total Cost in Surgical Material		
49.	First Material Input of Highest Relative Weight in the Direct Cost (%)		
50.	Second Material Input of Highest Relative Weight in the Direct Cost		
51.	First Service of Highest Relative Cost With Regard to the Total Indirect Cost		
52.	Second Service of Highest Relative Cost With Regard to the Total Indirect Cost		
53.	Third Service of Highest Relative Cost With Regard to the Total Indirect Cost		
54.	Service Cost as Proportion of Total Cost (% Direct Costs)		
55.	Service Cost as		

Proportion of the Total Cost (%Total Costs)		
56. Per Capita Cost		