

MANPOWER PLANNING

HEALTH MANPOWER PLANNING - HOSPITAL MANPOWER PLANNING

by

JOHN DAVID SEGUIN

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John David Seguin

Department of Health Care and Epidemiology

The University of British Columbia

2075 Wesbrook Place

Vancouver, Canada

V6T 1W5

Date March 1, 1981

## ABSTRACT

The main objective of this thesis is to present concepts and knowledge involved in manpower planning, health manpower planning, hospital manpower planning, and the development of manpower and staffing guidelines in hospitals. Along with this objective, it was felt necessary that this thesis offer a good review of approaches or techniques used in manpower planning, health manpower planning, and the development of manpower and staffing guidelines in hospitals. It was also felt that to receive the proper attention, a list of criteria or functions that are necessary to develop such guidelines be given. All of the foregoing was accomplished through a review of the literature and case studies which the author has found helpful. It is the main conclusion of this thesis that both manpower and health manpower planning have received wide respect and recognition. Hospital manpower planning for the development of staffing guidelines in hospitals has not been so fortunate. This type of planning is still in the embryo or infancy stage. Although it has not received the attention as manpower or health manpower planning, recognition for the importance of developing staffing guidelines is growing rapidly.

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CHAPTER I

Manpower Planning



During the past several years there has been an increase in demand in the use of hospital services. This increase has brought about and produced various changes in the use of manpower and staffing guidelines within hospitals. The kind of care which is required and demanded from such services as nursing, dietary, radiology, laboratory, medical records, and operating rooms has changed drastically over the past ten to twenty years. These changes have affected both the nature of the work required and the staff to meet the demands. Other hospital departments include the business office, housekeeping, laundry, and maintenance. Virtually every hospital department and services has undergone changes in the development of manpower and staffing guidelines.

The objective of this thesis is to present concepts and knowledge involved in manpower planning and the development of staffing guidelines for major hospital departments. Along with the first objective, a second one is to establish a list of criteria used in developing such guidelines. Both objectives will be covered through a review of the literature and case studies which the author has found helpful.

To set the stage and assist the reader, an analysis on the concept of manpower planning in general will

be given. Manpower planning will be defined along with other manpower terms. A description of methods used in forecasting manpower requirements will be presented along with the strength and weakness of each method. The need for manpower planning in hospitals will be developed and the chapter will end with a discussion on the remaining contents of the thesis.

"Manpower planning, strictly defined, is the activity of management which is aimed at coordinating the requirements for, and the availability of ... different types of employee. Usually this involves ensuring that the firm has enough of the right kind of labour at such times as it is needed. It may also involve adjusting the requirements to the available supply."<sup>1</sup>

"Manpower planning is an imprecise art, based on shifting bases. Successful results depend heavily on appreciation of the factors at work and sensitive evaluation of the data."<sup>2</sup>

"Manpower planning is an inter-disciplinary activity....The range of specialisms which can be brought to bear on manpower problems extends from the statistical and mathematical studies,.....to the sociological contributions...no particular discipline can claim a monopoly of interest in the field."<sup>3</sup>

"...the use of the term 'manpower planning' which has been gaining currency in recent years may legitimately give rise to several questions. It may well be asked in the first place what meaning can be attached to a term which embraces activities so diverse as math-

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<sup>1</sup>Angela Bowey, A Guide to Manpower Planning (London, The MacMillan Press Ltd., 1974, p.1.

<sup>2</sup>Thomas D. Larson, Organization and Manpower Planning (London, Business Publications Ltd., 1966), p. 111.

<sup>3</sup>"Aspects of Manpower Planning": A volume of papers published by the Manpower Society, edited by D. J. Bartholomew and B.R. Morris (London, The English University Press Ltd., 1971), p. ix.

emational work on stochastic models, the ergonomics of job design, the sociology of management development, and the more prosaic but no less difficult problems of an industrial personnel department. It is, in fact, difficult to draw up a precise definition of manpower planning which is broad enough to cover all these types of activity, but not too broad as to become almost meaningless and, in this, as in many other fields, the search for a precise definition may be misguided."<sup>4</sup>

Reviewing the foregoing definitions, one can readily see manpower planning takes in several dimensions. Impreciseness, inter-disciplinary activities, and supply-demand concepts all relate to defining manpower planning. It requires skill, experience, and sound judgment. The basic underlying concept is to see that there are the right types and amounts of human resources to meet the everyday and ever changing demands. Manpower planning is a broad and diverse term which embraces a wide spectrum of activities. The following definition of "manpower" will further show its extending components.

"The word 'manpower' itself connotes many dimensions of human resource development. Both as a term of art and as an area of public policy, manpower incorporates a host of economic and social considerations as these relate to people's entry into and progression within the world of work: education and training, health and nutrition, job discrimination, management of the national economy, operation of employing institutions, worker productivity, labor mobility and migration, workplace standards and regulation, wage determination and collective bargaining, and income security."<sup>5</sup>

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<sup>4</sup>Ibid., p. 1.

<sup>5</sup>A. Johnson, Knowledge and Policy in Manpower: A Study of the Manpower Research and Development Program in the Department of Labor, (National Academy of Sciences, Washington, D.C., 1975) p. 1.

Manpower planning is based on systematic attempts to anticipate requirements for personnel with particular skills, qualifications, and aptitudes. This is done in short (0-2 years), intermediate (2-5 years), or long range (beyond 5 years) forecasting periods. Most commonly this is done for periods up to five years in the future. Short and intermediate-range manpower forecasts of occupational requirements may be quite accurate for detailed occupational groups. Even with this there is a significant trade-off between the exactness of the forecast and the number of occupational details provided. The longer the forecast period, the more critical this trade-off becomes. Long-range forecasting becomes more difficult as decisions are made on vague or uncertain future conditions. This can often be a highly judgmental process and one that is based on special research and skills. Gordon McBeath, a British consultant and writer states:

"In my experience it is possible to forecast future staff requirements in detail for about a year ahead with a reasonably high degree of accuracy; beyond this, the accuracy level tends to fall away rather sharply, even in those companies which use reasonably sophisticated organization and manpower-planning techniques."<sup>6</sup>

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<sup>6</sup>Thomas D. Larson, Organization and Manpower Planning (London, Business Publications Limited, 1966), p. 103.

The forecast of occupational requirements is generally the first step in the manpower planning process. Burack and Walker express: "Forecasting of manpower demand and available supply constitutes the first step toward effective planning and programming of manpower resources."<sup>7</sup> This involves a definition of the basic elements in manpower planning: defining the forecasting needs of the organization and manpower supply that will be available within the organization at various times. The second step in manpower planning is where management uses these forecasts to establish a set of manpower policies or goals which correspond to the goals of the organization. The third step in the manpower planning is a design and implementation of the programs and activities used for recruiting new employees. These programs include various means of training and developing personnel already employed either to improve their performances or provide for advancement. The programs also include provisions for replacement of highly qualified or key personnel.

Manpower planning produces an allocation of the various skill requirements over different periods of time. This is done in both the forecasting and

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<sup>7</sup>Elmer H. Burack and James W. Walker, Manpower Planning and Programming (Boston, Allyn and Bacon, Inc. 1972), p.89.

policy stages of organizations. Manpower planning then involves the installation of the above programs to insure that these requirements are met. The inherent distinction between this and past practice is that it replaces intuitive or haphazard procedures with a structured and methodical approach that may be repeated and that may be improved when new and additional information becomes available. Meyer has clearly pointed this out:

"In summary, companies are replacing intuition and the haphazard approach to manpower planning and development with highly systematic and carefully planned programs to meet anticipated needs. Companies that continue to depend upon the intuitive approach or upon change alone for the development of their people are going to lose out in the competition to their more progressive competitors who are using systemic methods."<sup>8</sup>

In the post-war period, businesses have devoted increasingly large amounts of time and talent to technical and financial planning processes. This has included much work on the size, direction and timing of investments, location of plants, analysis of sources and types of finance, diversification of sources of supply of raw materials, and product development and marketing. It has been observed, however, that although expenditures on remuneration of labour and management manpower account for very

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<sup>8</sup>"New Directions for Managerial Manpower Planning", in Issues and Problems in Managerial Manpower Planning, edited by Lois Crooks (Princeton, New Jersey, Educational Testing Service, 1967), p. 117.

large proportions of the total budgets of almost all organizations, resources allocated by businesses to the provision of planning for manpower needs have generally been modest.

The absence of manpower planning is entirely reasonable in loose labour markets when there are excess supplies of unemployed and skilled people available to the firm on demand. If these excesses are expected to persist then there is no need for managers to make special plans to supply their firms with qualified personnel. However, such chronic excesses of skilled people are not generally experienced in the labour market. In advanced economies, technological change has created an ever increasing requirement for highly skilled managerial and technical talent. As it becomes more costly to obtain and maintain such people and more costly still to forego opportunities in their absence, it becomes increasingly important for firms to have a good idea of when and where they are going to need particular skills and how to go about getting them. There are two factors that must be considered:

- 1) Generally, the greater the required skill level, the longer the lead time required to train people for the jobs;
- 2) As business organizations increase in size and complexity, the task of matching people's skills, aspirations and interests to the jobs

available becomes more difficult.

To some extent, manpower planning must continue to be a judgmental process. There is a real danger in becoming too mechanistic in the planning process. What are required are balanced decisions made on the basis of structured exercises which reflect an awareness of both the present deployment of personnel, as well as a forecast of how the deployment will change in the future. To the extent that the overall plan functions properly it becomes a self-fulfilling process.

The forecasts create a future scenario and the programs to recruit and develop skills attempt to make the forecast come true. If the goals of the firm are realistic (these goals are still substantially the result of the judgment of senior management) and the operational phase of the plan works adequately, then the appropriate balance between judgment and structure has been achieved.

In the private sector the demand for workers is a derived demand. That is, the demand for labor is the result of the demand for the goods and services produced by the efforts of labor. For this reason, the first step in the manpower planning process - the forecast skill requirements - is almost invariably preceded by a forecast of the demand for the products currently produced by the business and the demand for other product lines into which the firm plans to



move during the forecast period. Skill requirements may then be forecast by using technical information on the anticipated occupational mix and output per man at the output levels expected in the forecast period.

Product and skill demand forecasts are obtained from mathematical models of varying degrees of sophistication. It should be mentioned that it is quite possible to produce a model which is too sophisticated requiring detailed and expensive data which cost more to generate than they are worth in terms of performance of the plan.

Once a forecasting model is specified, the results obtained from it must be presented to senior management. This information can then be combined with other research (financial, marketing, etc.) so that realistic corporate goals may be established. Then programs to attain these goals must be designed and put into place. These include systems to gather and assess information in both the external and internal labor markets. Information on the labor market outside the firm is necessary to organize effective recruitment programs. Information on the labor market inside the firm is required to monitor employees' performance and to assess their potential for promotion.

When all of these elements of the manpower plan

are operational, some degree of monitoring and evaluation are necessary to measure performance in the various elements, identifying both the strengths and weaknesses of the plan, and why they develop. Monitoring and evaluation constitute a feedback collecting process which enables revision and improvements of the original plan as well as allowing an accumulation of experience so that subsequent plans may profit from past successes and mistakes.

Unlike their counterparts in the private sector, manpower planners in the public sector are not concerned entirely with the derived demand for labour. They have the added responsibility of identifying groups which are unable to obtain stable employment in the private sector and of providing a range of manpower support programs for them. These support programs must include the best possible mix of training, placement and job creation activities.

It is in the job creation activities that the interests of government manpower planners are most substantially in divergence from the interests of planners in the private sector. For government planners job creation presumes that the work, and not the product, is the main objective. Placement and training programs are designed to integrate disadvantaged people into the private sector so that they can compete more successfully. Job creation may do this indirectly by allowing people to gain work

experience and adapt to the responsibilities of holding a steady job, but the products of this form of employment are not necessarily ones that people would choose to buy either in private markets or with their tax dollars. Job creation is primarily employment for the sake of employment.

For government agencies, the manpower program planning process can be outlined in a list of specific areas of concern. These areas are:

- 1) identification of those currently in need of manpower services;
- 2) definition of the kind of help the disadvantaged groups identified require;
- 3) forecasts of future labour market conditions on a regional basis to allocate budgets appropriately;
- 4) location of accessible jobs existing in local labour markets and forecasts of future areas of employment growth;
- 5) provision of various forms of skill development opportunities to facilitate placement function in the future;
- 6) provision of information to individuals to facilitate the job search process and to improve vocational choices;
- 7) provision of a job creation mechanism where the interaction between training, placement and the private sector is considered to be

inadequate;

- 8) determination of the appropriate resource mix to be expended on the activities listed above.

Like corporate planning, government programs cannot be allowed to become too mechanistic. Statistics and models are useful for providing an understanding of the problems to be addressed and the way in which these problems can be expected to develop in the future. However, effective planning must include an awareness of the leeway that exists in allocating resources among geographic areas and among alternative activities, and must also include knowledge of the available alternatives as well as a sense of the impact of the various choices on the problems identified.

Manpower planners require a clear but not too detailed picture of current and future demand for and supply of labour and of the elements affecting them. Planners in the private sector require forecasts of the demand for their products to obtain such a picture and a knowledge of the relationship between output levels and skill requirements. Government planners dealing with aggregate employment and unemployment in a region will want general information on economic performance and specific information on occupations or groups where there are particularly severe unemployment problems. This

specific information includes detail on any peculiarities of particular occupations such as seasonality, institutional factors (unions, or one of the two dominant employers) as well as information on the characteristics of the people affected.

Manpower planning is a relatively new endeavor and must not be allowed to become too mechanical. The issues dealt with by manpower planners are extremely complex. Included are economic, social, political and personal forces which are difficult to forecast and virtually impossible to control. Decisions should be taken on the basis of a replicable framework but must include sufficient flexibility to allow for the unforeseen. Departures from the models will be frequent, but there must be a basic process from which to start and to which to return.<sup>9</sup>

This chapter will now focus on some of the processes from which to start and which to return. Different methods and techniques used in manpower planning will be presented. The strength and weakness of each method will also be given.

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<sup>9</sup> Reproduced with permission: This was a report prepared as a reference to managers and counselors on the subject of Manpower Planning. The report was written by the Department of Manpower and Immigration, Regional Economic Services Branch, Pacific Region. Sources: BURACK, Elmer H. and WALKER, James W., Manpower Planning and Programming (Boston: Allyn and Bacon Inc., 1972); KEYS, B.A. and WRIGHT, H. H., Manpower Planning in Industry, (Ottawa: Queen's Printer, 1966); MANGUM, Garth and SNEDEKER, David, Manpower Planning for Local Labour Markets, (Salt Lake City: Olympus Publishing Company, 1974).

## Methods Used in Forecasting Manpower Requirements

There is no single universally accepted method for projecting manpower supplies and requirements.

"Forecasts may be calculated in a wide variety of ways, ranging in complexity from simply linear extrapolation of past trends to complex econometric models. Each technique has its own special properties of detail, conditional restraints, and applicability to reality."<sup>10</sup>

Many approaches or techniques used in forecasting may overlap and have various points in common. At times the manpower planner may not find a method to suit his forecasting needs. He may be forced to look at a number of methods and extrapolate those points he feels are necessary to make a more accurate manpower forecast. The best approach is often derived from a borrowing of several techniques and incorporating these into one's own method of manpower forecasting.

Following is a brief description of various techniques or methods of forecasting used in manpower planning. These include econometric methods, productivity methods, and survey methods. A final discussion will be on trend projection methods which take in freehand extrapolation, semi-average, and regression analysis.

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<sup>10</sup>Herman Stekler, Economic Forecasting (New York: Praeger, 1970), pp. 3-15, 92-102.

Econometric Methods

"The econometric method of manpower forecasting is a technique for deriving occupational labour requirements from estimated levels of final demand for goods and services in the economy in some future year. The novelty of the method is its use of the conventional input-output analysis as an analytical tool for forecasting manpower requirements."<sup>11</sup>

There are four basic steps in comprising this method. The first step is construction of an input-output table showing the flows of industry and levels of final demand. The second step is the recasting of the input-output table into a matrix. This is done to show the input ratios or fixed technical coefficients of each sector. Step three is the formation of all (aggregate) manpower requirements from production levels. The last step is the construction of a sector-by-occupation matrix which demonstrates the distribution of aggregate manpower requirements into particular occupations and specific occupational requirements.

Econometric methods have the advantage of producing refined and instrumental forecasts of manpower requirements by individual occupations. A strong point in its favor is that it does this within the framework and relationships of the entire economy.

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<sup>11</sup>Ozey Mehmet, Methods of Forecasting Manpower Requirements: With Special Reference to the Province of Ontario (Centre for Industrial Relations, University of Toronto, 1965), p.3.

In this sense, manpower planning and forecasting become a vital part of a global and over-all economic policy. This type of method also makes possible the origin of information about the structure and working of the economy. It produces important knowledge about investment, consumption, production levels, etc..

A major draw-back or weakness of the economic method in manpower planning is the insufficiency of truthful data and information. Because it requires several experts and analysts, the econometric method is both costly and time consuming.

#### Productivity Methods

The productivity method, forecasts employment for various target-years by sector and occupation. This is done concerning both the change in labor productivity and the increase of output.

Determining the output in the target-year for the entire economy and each sector is the first step in this method. Output in any target year can generally be obtained from an agency that is directly responsible for such forecasts. The second step is a derivation of total employment in the target year and estimation of sectoral manpower requirements on the basis of estimates of productivity in the most important sectors. Sources of occupational requirements from sectoral totals is step three. The fourth



step involves converting rough or crude labour requirements into trained manpower and deriving the educational requirements. Step five is a comparison of educational requirements with supply. The final step is a general re-assessment and evaluation of the first five steps considering anticipated labour market inequalities.

Productivity methods have the advantage of coordinating manpower forecast with, and integrating into, the overall economic development plan. Requirements for manpower are worked out on the principal of prescribed rates of economic growth. Because of this, requirements are, in effect, signs of the types of manpower required to meet the growth targets presumed in the first place. Productivity methods give a dynamic balance between the education system and qualified manpower needs.

The weaknesses associated with this method are the difficulties in determining target year outputs and deriving occupational requirements from aggregate sectoral requirements. A final draw-back of productivity methods is the difficulty in expressing unvarying relationships between a specific education programme and specific occupation.

#### Survey Methods

The survey method makes practical use of manpower requirements of employers for forecasting manpower

demand at a given target year. Surveys, interviews, or questionnaires may be used among a sample of organizations or firms in order to predict the employer's future manpower needs.

The first step in this method is to formulate both an analytically sound and operational definition of the organizations or firms to be studied. A definition of the technique or approach to be used in the selection of sample firms is the next step. The proportion of total employment of the sample organization or firm to the total employment in that industry should be high. The results of the survey are used in making predictions for future manpower requirements.

The main advantage to this method is that surveys and interviews can be made at established or frequent intervals. This means that manpower requirements and demand can be kept moderately up to date.

The main problem associated with this method is that firms included in the sample may not respond to the survey. They may be unable to estimate their manpower requirements or may even wish to avoid making any statements. Another weakness of the survey method is that almost invariably, errors may occur in the replies of the survey. This can be due to interpretations of statements, terms, or questions. A final problem associated with this method is accuracy of individual employers in foreseeing the effects

of technological improvements on their firm or organization.

### The Trend Projection Method

The trend projection method is used to project past trends of aggregate and occupational labour forces through to the target years. The requirements are then read off a graph. There are a variety of variations with this method. They require the availability of time-series of the total labour force by sectors and occupations. Trend projections are also done for a reasonable number of years. The following are various methods of trend projections in manpower forecasting:

#### "The Freehand Extrapolation Method:

Of the difference variations of the trend projection method, the freehand extrapolation method is the simplest one. It consists of plotting the graph of the labour force series on a graph-paper and fitting a trend through it by means of a freehand extension of the graph, such that the trend appears to the eye to describe the long-term growth of the labour force. The weakness of this method is that it requires a high degree of subjective judgment since the forecaster is obliged to guess the magnitude and character of the future course of economic events.

#### "The Semi-average Method:

There is a relatively simple statistical technique for computing trend lines. The data are split into two equal groups and the figures in each half are then averaged. The averages thus obtained are in turn plotted against the centre year of the respective group, and a straight line is drawn through the two points. Extending this line to the target-year, estimates of the labour force in that year may be derived. This, as can be observed, is but a mechanical operation and therefore should be handled with caution.

"The Regression Analysis Method:

This method is designed to be used in distributing the aggregate target-year labour force into sectoral and occupational categories. That is to say, its use presupposes the knowledge of total labour force in the target-year. Usually, this initial operation is executed by applying participation rates to projected population figures.

The method is usable only if there is a high degree of linear correlation between the aggregate labour force and the specific sectoral or occupational subdivision."<sup>12</sup>

The trend projection method is often used only to derive fairly general or tentative manpower forecasts. The major weakness of this method is that results are determined on past trends that require a considerable amount of data going back a fair number of years.

Now that a description of various methods of forecasting manpower requirements has been given, this thesis will briefly address the need for manpower planning in hospitals. Advances in technology, computers, lab analyzers, etc., have all affected staffing patterns in hospitals. Although new and sophisticated equipment imply reductions in staff, this is not always the case. Expensive equipment brings with it personnel for maintenance and day-to-day operations of such equipment. Accreditation and other professional bodies contribute to standards which also change staffing needs. Patients themselves are demanding more

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<sup>12</sup>Mcbeath, op. cit., pp. 22-23.

and more services from hospitals. This, too, adds to the numerous manpower needs hospitals face each day.

Many new and current hospitals are now under construction, remodeling, or in the planning stage. The need for manpower planning in hospitals is prevalent. Planners must continually strive for methods and techniques that develop accurate staffing guidelines. A knowledge of the previous techniques used in manpower planning is not enough. The planner must also understand methods used in health manpower planning. Once a knowledge of these two has been obtained, the road to hospital manpower planning can begin to take its course.

Chapter Two will discuss health manpower planning. Again, different methods, approaches or techniques used in health manpower planning will be given. The strength and weakness of each method will also be presented. Chapter Three will address hospital manpower planning and the development of staffing guidelines. The need for this type of planning will be demonstrated. A general description of major departments will be given along with a list of functions or criteria to be used in the development of such guidelines. Chapter Four will include conclusions and a review of the thesis. The State-of-the-Art and suggestions for future research and study will be given.

CHAPTER II

Health Manpower Planning

## Concepts in Health Manpower Planning

The concept of health manpower generally includes: the number of individuals available for, or undergoing training in the different health occupations; the demographic characteristics of these individuals; their social characteristics in terms of education, experience, and values; and the changes required, both in numbers and qualifications of personnel, to provide the health services needed and demanded by a population. As generally understood, therefore, health manpower includes:

- 1) Those already working in the field of health services;
- 2) Potential health workers, i.e., those who have the ability to engage in a particular health occupation but are not at present doing so; and,
- 3) Prospective manpower, i.e., those who are at present undergoing education and training that will permit them to join the health services.<sup>1</sup>

"Health manpower planning is the process of estimating the quantity and type of knowledge, skills, and abilities needed to introduce predetermined alterations in the functioning of a health system so as to make it more probable that the desirable changes in the health of a

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<sup>1</sup> World Health Organization, Technical Report Series No. 481, The Development of Studies in Health Manpower, (Geneva, Switzerland: World Health Organization 1971), pp. 9-10.

population will be achieved. Such planning involves specifying who is going to do what, and also where, when, how and for what patients or population group, so that knowledge and skills necessary for adequate performance can be established and made available according to a predetermined schedule. This must be a continuing, not a sporadic process."<sup>2</sup>

Health manpower planning implies the generation and utilization of various skills. This type of manpower planning analyzes and projects health needs along with the population's demands for health services. The measurement of present health manpower, patterns of utilization and estimation of future manpower requirements are all considered. Education, training needs, and the detection of any imbalances between the estimated requirements and the expected supply are elements crucially involved in the planning stages.

"Manpower is a major key to meeting our nation's health problems. There is important statistical information that can identify, qualify, and assist in evaluating the status of their trends in training, employment, utilization, and demand for health manpower. Classification by health occupation identifies those individuals possessing knowledge and skill unique to the health field, the range and diversity of health careers, and the employment of persons for the progression of health services, for environmental control and protective services, and for teaching, research, and administration in the health field."<sup>3</sup>

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<sup>2</sup>Ibid., p.1.

<sup>3</sup>Maryland Y. Pennell and David B. Hoover, Health Manpower Source Book 21 - Allied Health Manpower Supply and Requirements: 1950-1980 (Washington, D.C.: U.S. Government Printing Office, 1970), p.1.



Ideally, health planning should be integrated into broad socio-economic planning for a nation as a whole, within the context of activities in sectors such as agriculture, education and industry. Within health planning itself there are a number of sub-sectors, e.g., manpower planning, planning for facilities and equipment, and organization planning, all of which are interdependent. It is not always possible to draw sharp dividing lines between the sectors of national socio-economic planning; agriculture and health obviously overlap in the area of nutrition; and education affects the utilization of health resources. The same is true of the subsectors. Planning for the location of facilities can profoundly affect the distribution of manpower and the organization of services, and vice versa.

Despite the interdependence, planning for education is no substitute for planning for health, and facilities planning is no substitute for manpower planning. The proper relationship of health manpower planning to overall health planning must be recognized, as must the relationship of overall health planning to national socio-economic planning.

It is rare that sufficient resources are committed to allow health planning to advance on all fronts simultaneously. However, because of extensive interdependence it is quite feasible to approach planning of the health sector with considerable

breadth--although not comprehensively--through one of its subsectors. Thus, health manpower planning may move deeply into questions of financing and organizing health services. Similarly, central problems of health planning can be approached from the standpoint of financing or of organization. The subsector approach is a practical expedient that has been adopted in a number of countries. Manpower has often been chosen as the principal focal point of such studies because of the critical importance of manpower problems in health planning.

There are no precise criteria for determining what health manpower planning should encompass and what problems it should try to solve. There appears to be agreement that it should include an examination of the existing supply of health workers, the sources of supply, and the prospects for future supply. Beyond this, policy questions arise that may or may not lie within the purview of a manpower study. To begin with, a planner needs to know what the health problems are in order to set goals and to plan solutions. Although it may be conceded that planners do not set goals themselves, but only make recommendations to political authorities, planners still need some guides to enable them to proceed with their work. The extent to which manpower planners should participate in health goal-setting processes would

appear to be affected by the amount of other planning machinery that exists.

Similarly, the reorganization of health services involves not only means but also ends, or goals. It is virtually impossible for manpower planners to avoid organizational questions. Manpower specialists usually delineate two major dimensions to manpower problems: (a) supply, which concerns the number of available workers having various kinds of skills; and (b) organization, which concerns the distribution of workers, the distribution of tasks among workers, and their inter-relationships.<sup>4</sup>

Through optimum utilization of available and the future supply of manpower we can provide the most economical mix of profession and auxiliary health workers. The utilization, delivery, and quality of health services can be improved by effective and efficient manpower planning. Proper manpower planning consists not only of people, but also a knowledge of the various jobs and skills they must possess. Appendix A provides a list of health occupations which the planner must be familiar with. Approximately 375 titles are listed. The list is restricted to those for which special education or train-

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<sup>4</sup>H. P. Hilleboe, A. Barkhuss and W. C. Thomas, Jr., *Approaches to National Health Planning* (Geneva, Switzerland: World Health Organization, 1972), pp. 87-88.

ing is needed to prepare the worker to function in a health setting. One of the difficulties in health manpower planning is the difficulty that arises from the long "lead time" required to bring about changes through some education and training programs. The education, training and professional preparation of physicians takes nearly 20 years.

"For a profession such as medicine, even a ten-year planning period is insufficient. Decisions made in year one can begin to affect supply only by year eight and nine."<sup>5</sup>

Before presenting a detailed description of methods and techniques used in health manpower planning, a discussion on the characteristics of the demand for health manpower services is needed. Two types of health care demands placed on manpower services are those which are placed directly on private practitioners and their employees, and those which are placed on health care institutions (e.g., hospitals, nursing homes, psychiatric care facilities, etc.) which in turn establish requirements for health personnel. Both types of demand are usually preceded by the health consumer decision to seek some form of health service. Thus, the analysis of

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<sup>5</sup>T. L. Hall, Health Manpower in Peru: A Case Study in Planning, (Baltimore, John Hopkins, 1974), p.7.

the demand for health manpower services requires an understanding of the factors which influence the consumer's health, his behavior, and his consumption of health manpower services. Factors which influence the consumer's behavior include an individual's cultural beliefs, attitudes toward health care, psychological condition, and perception of illness, as well as the relative utility, cost and quality of health care which he perceives. Since data describing these parameters are difficult if not impossible to obtain, most analyses attempt to describe variations in health service utilization in terms of socioeconomic, demographic, or other differentiable attributes of the population, as well as changes in epidemiological conditions, price, and other health system parameters. These patterns of health service utilization are then used to describe the influence of consumer discretionary behavior on the demand for health services.

For the results of these analyses of health consumer demands to be useful in health manpower planning, they must be translated into requirements for manpower services. The way in which these requirements are met will depend not only on the magnitude and type of services desired, but also on the staffing patterns and manpower resource levels as determined by the operational and functional limitations of health care delivery organizations.

Variations in type of services offered and the size of the health service facilities utilized, as well as differences in the allocation and mix of personnel, will have a compound effect on health manpower requirements. These health care delivery factors act as constraints which affect the requirement for manpower at a given level of utilization. They also shape and mold the type of care sought by influencing the prices, accessibility and availability of services offered. Thus, in order to simplify the discussion of these highly interrelated analysis factors, the description of these areas for analysis is organized into three categories -- cultural-demographic factors, economic factors, and health care delivery constraints.

#### Cultural and Demographic Factors

The type and magnitude of health care services demanded are often stratified for analysis in terms of parameters such as age, sex, marital status, family size, education, and residence (urban vs. rural). For example, the incidence of illness, morbidity patterns, disease recovery rates, and mortality rates all vary with age. Females in different age groups require different quantities of obstetrical service, and men require none. Marital status and family size reflect the availability of home recuperative care, and hence can be used to

characterize total amounts of service demanded. Differences in cultural beliefs and social attitudes toward utilization of health care might be distinguished by an individual's education and/or location of residence.

Data describing the above (and other) cultural/demographic population attributes and health services consumption are used as a basis for determining health service utilization behavior. Predictions of the relative numbers of persons in each population category coupled with descriptions of the health service utilization behavior provide for a mechanism for estimating future service consumption, and hence requirements. These estimates are, however, often constrained by limitations inherent in the available data. Relationships between different types of utilization and the desired set of demographic factors are difficult, if not impossible, to ascertain since the cross-sectional and/or longitudinal utilization data required is often unavailable, incomplete, or inconsistent. However, these data constraints can be overcome under certain circumstances, either through statistical manipulation or existing data or extensive data gathering and/or identification activities.

Although the analysis of cultural-demographic factors may increase understanding of health consumer behavior patterns, it offers a few areas where

health agencies can intervene and improve health service utilization. One such policy action which could affect utilization is the education of the consumer, particularly in the area of health or health-related subject material. Health education, for example, could change cultural attitudes and increase public awareness of alternative forms of treatment and service delivery. Greater understanding of disease symptoms and treatment of self-limiting illness could result in earlier detection and hence treatment of serious illnesses and a reduction in the utilization of health services for minor ailments. An educated consumer could possibly differentiate levels of service quality being offered and select the type of service most cost/beneficial to him. Furthermore, a part of this educational activity could be devoted to dissemination of information on the availability of free preventive treatments such as x-rays, pap smears, and vaccinations, as well as to inform the public of impending epidemics (e.g., flu or syphilis) or health hazards (e.g., environmental pollution, severe weather, or dangerous working conditions). Although there are other cultural-demographic factors which could be influenced by governmental intervention such as marital status, family size and residence -- educational information dissemination programs appear to be the only actions contemplated in the near future.



In addition to the aforementioned limitations, analysis of the influence of cultural-demographic factors on health service utilization will not reveal the effects of economic factors on the demand for services, nor does it reflect the constraints placed on the consumer by the health service system. The analysis of the effect of these latter factors on health service demands is the topic of the next two subsections.

#### Economic Factors

Two economic factors which affect the demand for health services are the price of services (i.e., the cost of health care to the consumer) and the income ability of the consumer to pay for services offered. The cost of medical care to the consumer consists of not only the fees charged and/or prices demanded by physicians and health institutions, but also other intangible costs such as loss of leisure time, difficulties in obtaining health care, and other inconveniences which confront the health consumer. Since most of the nonmonetary costs are the result of restrictions placed on the consumer by the health delivery system, discussion of these costs will be left to the subsequent subsection. This will concentrate on direct and indirect (e.g., loss of income) monetary costs of health care service, and the effects of these costs on the utilization of health services.

Prices of health care affect not only an individual's decision to seek health services, but also the amount and type of service he uses. For example, the price of health services may influence whether or not a person decides to have elective surgery to improve a chronic condition, to remain in a hospital for a longer recuperative period, or to seek the services of a medical specialist or a general practitioner. The outcome of such decisions may also be influenced by the consumer's ability to pay, a combination of his income and coinsurance.

Analysis of the effects of these factors on the utilization of services is necessary to assess the impact of economic programs aimed at decreasing the cost of health care or reducing health economic barriers confronting low income groups. The effects of programs designed to decrease the cost of care to selected groups (e.g., Medicare and Medicaid) are proposed programs aimed at ameliorating the total cost of care on the overall demands for health services need to be examined. Significant reductions in cost of health care to the consumer could increase the quantity of care demanded which may, in turn, escalate the price of care in the short run. Within these programs, alternative reimbursement systems (e.g., prospective vs. retrospective payment) should be examined with respect to their possible moderation

of escalating health care costs.

The relationship between income and the consumption of health services should be examined to determine the effects of this factor on the overall utilization of health services. Different income groups may consume differing quantities and types of health service. Persons with higher incomes may select more comprehensive forms of care (e. g., yearly physicals and elective surgery), have longer lengths of stay in health institutions, utilize more specialized services, and pay higher prices for similar services. Furthermore, the consumer's ability to pay for care could influence a physician's selection of treatment modality and partially account for the amount and type of health services utilized.

A third factor which must be specifically taken into account in analyzing the economics of health care utilization is health insurance. Health insurance not only distorts the impact of costs and income factors on utilization, but also influences the quantity and type of medical care demanded. Insurance protects the individual consumer from unexpected expenses by distributing the cost of medical care across the insured population. By lessening the cost of health care, patterns of consumption are altered. Individuals confronted with "bargain" care are more likely to increase their demand for care, particularly those types of care which offer the greatest insurance

coverage. For example, hospital care may be sought instead of ambulatory care because of specific insurance provisions. Similarly, there may be increased demands for specialists vs. general practitioners since their services are more completely insured. Health insurance programs sponsored by the federal government (e.g., Medicaid and Medicare) and by other third party contributions (e.g., company insurance programs) can be viewed as effectively increasing an individual's income and selectively changing his ability to pay for health care services.

The interrelationships between the above factors -- health service utilization and alternative economic policies and programs of governmental planning agencies -- need to be identified to develop, implement, and assess these alternative courses of action. The impact of tax incentives directed toward increasing individual and employer expenditures for health insurance, federal and state welfare programs aimed at decreasing the medical costs of increasing the income of the indigent (e.g., Medicaid), and government-supported health care clinics which provide low cost or free services (e.g., neighborhood health clinics) additionally should be addressed in this analysis.

#### Health Care Delivery Constraints

In addition to the economics and cultural-

demographic factors which influence and characterize an individual's decision to seek health services, external health care delivery constraints may limit and mold the choice of alternatives available to the health consumer. The accessibility of different services may not only influence the type of care sought, but also contribute to the decision to seek care. The disutility associated with consumption of services which require encumbering appointment procedures, long travel or waiting times, or other similar inconveniences, may significantly influence a consumer's decision process. Similarly, the relative accessibility of alternative health delivery forms may affect the type of care utilized.

Alternative modes of health care delivery such as prepaid vs. fee-for-service care; group vs. solo practice; and preventive vs. episodic medical care, affect the manner in which these services are utilized and hence influence the manpower service requirements for patient care. For example, group practices may place greater dependence on auxiliary personnel to provide continuity of care for chronic illnesses than would a solo practitioner; or preventive medical services may require fewer inpatient services (i.e., shorter lengths of stay, fewer admissions, or both) and more outpatient visits than its episodic counterparts; or prepaid patients may demand

more services than fee-for-service patients.

Inherent in the health care delivery system are a complex set of procedures which further constrain the action space of the health service consumer. Foremost among these is the restriction that all but the most simple of medical care services requires some interaction with a physician. As a consequence, the physician acts, in part, as a buyer of health services for the consumer. The patient-physician relationship results in the physician rather than the consumer placing demands for many kinds of health services. Physicians not only select the method and location of treatment, but also as a consequence of these decisions, determine the overall magnitude and type of health service required for each illness episode. Factors which influence the physician's decision process include: training and specialized orientation (e.g., a surgeon may treat specific health problems in a different manner than an internist or a general practitioner); special institutional agreements and arrangements (e.g., hospital appointments, clinical testing and laboratory arrangements, etc.); patients' interest (i.e., cost and quality of alternative treatment modalities); and the physician's personal benefits (e.g., income, leisure time, utility, etc.). The physician's decision space is also constrained by

the limits of preferred medical practice and professional or organizational sanctions which preclude certain actions, such as prolonging a patient's hospital stay or admitting patients to a hospital unnecessarily. Other procedural constraints which are outside the spectrum of physician control are those principally imposed by facility and personnel limitations (e.g., number of beds, type of laboratory facilities, size of hospital staff, etc.).

In addition, the decrease in the relative number of physicians offering what is currently referred to as primary health care (i.e., general or family practice) may result in increased difficulty in obtaining this type of care and subsequently cause inappropriate utilization of medical specialists for self-limiting or non-specific illnesses. This increasing utilization of specialists for initial treatment requires greater consumer medical knowledge (i.e., health education) to select the correct medical discipline and is subject to greater misuse of health manpower talent and a resulting increase in total demand for manpower services.<sup>6</sup>

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<sup>6</sup>U.S. Department of Health, Education and Welfare, Bureau of Health Resources Development, An Analysis of Health Manpower Models: Volume 1, DHEW Publication No. (HRA) 75-19, 1974, pp. 11-20.

How does one select the proper number or statistic to meet the demands for health manpower? This section of the thesis will provide a description of various such methods used in health manpower planning. Along with the description, strengths, weaknesses, and questions posed by each method will be given. A comparison of the different methods will also be given showing the advantages and disadvantages of each approach. Before discussing the various methods or techniques, it is well to remember that just as in manpower planning, each method in health manpower planning also has its own special properties and merits. Again, the best method may be derived from a borrowing of different approaches and blending them into one.

"...no single method of measuring requirements has proven entirely satisfactory or universally applicable, and no simple guidelines or consensus exist about the most appropriate methodology. The lack of agreement reflects the general lack of knowledge about the forces influencing the demand for health care, about the conversion of that demand into manpower requirements, and about the supply responses to changing circumstances. It also reflects differing opinions about concepts and definitions. Even when there is agreement on factors that must be measured, there is a gap in our knowledge of how best to proceed. For example, we know that "head counts" by discrete occupations are misleading; that the health professions function in a complex web of complementarity and substitutability. There is also no accepted method for measuring the output of health workers, or even agreement on the output to be measured -- visits, hours, expenditures,



income, etc. In other words, there are inadequate input and output measures to translate in an accurate way the manpower demand and supply into the demand and supply of services and vice versa."<sup>7</sup>

As discussed earlier, manpower planning is a process whereby goals, objectives, priorities, and activities for health manpower development are determined in a systematic fashion, in order to ensure that health manpower resources, both current and future, are adequate to meet the requirements for the delivery of health services to a population.<sup>8</sup>

In short, one major concern of health planners is to ensure the proper "manning" of the health care delivery system. They must see to it that the right number and types of health manpower are available when and where they are needed. They must plan for the human resources to meet the requirements--which include timeliness and acceptable cost--generated by the decisions of health care providers to deliver health services to a defined population group.

To accomplish these goals, health planners must gather two kinds of information. The first concerns

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<sup>7</sup>U.S. Department of Health, Education and Welfare, Bureau of Health Manpower, Review of Health Manpower Population Requirements Standards, DHEW Publication No. (HRS) 77-22, 1976, p.1.

<sup>8</sup>U.S. Department of Health, Education and Welfare, Health Manpower Planning Process, H.E.W. Document No. H.R.A. 76-14013, p.3.

the existing stock of manpower in terms of their number and type. The second kind of information concerns present or projected requirements for health manpower. Complicating the planner's job is the fact that planning is, generally speaking, a future-oriented activity. Thus, care must be taken to account for the inevitable time lag between planning and implementation. There are many questions which the health planner must consider in this connection. For example, how long does it take to educate a health professional? What are the likely changes in utilization or productivity standards that will result from pending or anticipated legislation? What are the potential demographic changes within the planning area or population that will affect requirements for a balance between the resources available and the resources required?<sup>9</sup>

Alternative methodologies for estimating requirements are available to the local planner, but no one method is universally applicable and error free. Experience has shown that different methods produce different estimates. A 1970 investigation of six earlier projections of 1975 physician requirements based on different methodologies found the estimates vary significantly, ranging from

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<sup>9</sup>Ibid., p.4.

305,000 to 425,000 and that the findings led to opposing conclusions concerning the adequacy of the projected supply of physicians.<sup>10</sup>

Different methodological approaches discussed in this thesis will include the manpower population ratio approach, the service targets approach, the health need approach and the economic (effective) demand approach. These four approaches to estimating manpower requirements are the most commonly used in health manpower studies. Two other methods that can either be integrated with the other approaches or used by themselves will also be discussed. These are the functional analysis approach and the use of models approach. The latter two techniques have been used in numerous studies of specific health occupations or communities, but have not as yet been widely used on a national scale.

#### MANPOWER/POPULATION RATIO APPROACH

This is the most popular and widely used approach for determining health manpower requirements. This method is used to characterize current manpower situations and to assess the adequacy of the

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<sup>10</sup>Hansen, Lee W., "An Appraisal of Physician Manpower Projections," Inquiry, March 1970.

present supply of health manpower. The method is also used to study the geographic distribution of health workers and to determine the number of personnel that will be required to provide the community with health services in the future.

The basic idea of the manpower/population ratio approach is that population size is the main determinant of manpower requirements. Area population statistics and the desired ratio of health manpower to population are the two elements essential to apply this method. A ratio of the number of health manpower to the total population served is selected. The simplest method of estimating and forecasting manpower requirements is to calculate the actual ratio of manpower to population and then compute the manpower required to meet this standard for another population. In the formula to calculate manpower requirements, the ratio is applied to the target year population.

$$\frac{\text{Manpower}}{\text{Population}} \times \text{target population} = \text{Estimated manpower requirements}$$

The numerator in the ratio, manpower, may refer to discrete occupations (e.g., radiological technologist) or to generic categories (e.g., allied health occupations). The term may be limited to health personnel providing service in a particular setting (e.g., nursing homes) or to a particular type of care (e.g., pediatric), or it may be all-

inclusive encompassing the totality of workers in the health industry.

The denominator of the ratio, population, may be defined in different terms depending upon the planner's concerns: total community population, if the problem deals with environmental health; citizens 60 years of age and older, if the concern is to staff nursing homes and treat chronic illness; the residents of a geographically defined service area, if the issue is adequate ambulatory care.<sup>11</sup> The ratio of one area can be used for another point in time, or a comparison can be made across both time and space. Also, other types of population standards can be employed, such as providers per population from a typical HMO. Similarly, visits or some other measure can also be related to population.<sup>12</sup>

If the target ratio is selected correctly, the amount of services supplied will be adequate when the actual ratio is equal to the target ratio. If

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<sup>11</sup>U.S. Department of Health, Education and Welfare, Bureau of Health Planning and Resource Development, Methodological Approaches for Determining Health Manpower Supply and Requirements: Volume 1 Analytical Perspective, DHEW Publication No. (HRA) 76-14511, 1976, p. 33.

<sup>12</sup>U.S. Department of Health, Education and Welfare, Bureau of Health Manpower, Estimating Manpower Requirements: A Background Paper, Report No. 76-114, Washington, D.C.: U. S. Government Printing Office, 1977, pp. 12-13.

the ratio is not based on conditions in the country or area concerned, but is simply taken over from another country at a more advanced stage of development or from a more favored region within the same country, it is not clear how its adequacy can be established. It must also be borne in mind that, because of dramatic technological changes that are taking place, the validity of any particular ratio is of limited duration.<sup>13</sup>

#### STRENGTHS AND WEAKNESSES OF THE MANPOWER/POPULATION APPROACH

The simplicity of the method is its greatest advantage. Relative to other methods, data requirements are minimal, and the statistics are easily obtained; the estimates can be prepared in short order at low cost; the methodology requires modest staff expertise. It is useful as a descriptive device, as an input to more sophisticated methodologies, as a validation of estimates derived by other means, and as a datum to be used in producing more thoughtful judgments.

The weaknesses of the method are serious and may be overriding. Inevitable changes in the future in-

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<sup>13</sup>World Health Organization, Technical Report Series No. 481, The Development of Studies in Health Manpower (Geneva, Switzerland: World Health Organization 1971), pp. 12-13.

volving socioeconomic conditions, technological and biomedical advances in health care and the configuration of the delivery system are ignored, although they affect the amount of services health personnel will provide. To ignore these changes and focus on population growth may be feasible in the very short run, but it is perilous for long-term projections. It has been pointed out that "manpower/population ratios do not take into account the variations in the size of service areas for a particular type of manpower as the population density changes."<sup>14</sup> Furthermore, it is untenable to assume that a fixed relationship of manpower to population is appropriate for any length of time other than the immediate. But even if the assumption about a fixed ratio of manpower to population is relaxed and changes in the standard ratio are allowed during the projection period, thus obviating some objectionable aspects of this methodological approach, the particular ratio chosen may be suspect -- whether it be designated by expert opinion or by the standard found in another area. In fact, if the designated ratio is based on a standard higher than that existing in the planner's

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<sup>14</sup>U.S. Department of Health, Education and Welfare, Bureau of Health Resources and Development, The Delineation of Economic and Health Service Areas and the Location of Health Manpower Education Programs, Washington, D.C.: U. S. Government Printing Office, 1974, p. 149.

community, the conclusion that a shortage exists is built into the methodology and is inevitable.

Aside from the unrealistic nature of the underlying assumptions, local health planners may encounter a data problem. Population and manpower data may not be published for the relevant labor market or health service delivery area. Available data may not apply to the manpower categories under study, or may use varying occupational titles and different job descriptions. In addition, data gaps may make it difficult or impossible to develop a time series from which to study historical relationships in order to select a ratio.

With this methodological approach, as with the others, the strengths and weaknesses must be weighed in terms of the options and circumstances that face each planner. Severe criticisms can be leveled against the ratio method, but its use in many instances reflects the fact that more satisfactory approaches may not be feasible. In fact, most studies use the manpower/population ratio at some point.<sup>15</sup>

#### SERVICE TARGETS APPROACH

This approach addresses the question as to how

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<sup>15</sup>U.S. Department of Health, Education and Welfare, Bureau of Health Planning and Resource Development, Methodological Approaches for Determining Health Manpower Supply and Requirements: Volume 11 Practical Planning Manual, DHEW Publication No. (HRA) 76-14512, 1976, pp. 39-40.



many services of each kind should be produced to meet expected requirements for health care, and what manpower will be required to provide these services or targets. The "targets" must be clearly specified and derived from statements made by public leaders, professional associations, or other qualified authorities.<sup>16</sup>

Data essential for the service targets approach are: (1) population, (2) quantitative standards or norms for health services, (3) work assignments and staffing patterns followed in the provision of services, and (4) manpower productivity.<sup>17</sup> The first step in applying the method is to set the target of the types of quantity of services required by the population in the local area. The constraints of the particular program and of the health delivery system are taken into account in selecting the service goals. With the service targets quantified, manpower requirements are derived by applying factors related to manpower staffing and productivity. Neither of these factors is easily quantified.

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<sup>16</sup>World Health Organization, Technical Report Series, No. 481, The Development of Studies in Health Manpower, (Geneva, Switzerland: World Health Organization, 1971), p. 13.

<sup>17</sup>U.S. Department of Health, Education and Welfare, Bureau of Health Planning and Resource Development, Methodological Approaches for Determining Health Manpower Supply and Requirements: Volume 11 Practical Planning Manual, DHEW Publication No. (HRA) 76-14512, 1976, p. 41.

"To illustrate the methodology of the service targets approach with a simple example, let us suppose that the question the planner needs to answer is, 'How many emergency medical technicians (EMT's) are required for adequate service in our community?'

First, we define the service target: say that the number of ambulances required is established as one ambulance per 10,000 people, based on the analysis of the past year's emergency calls and the organization of ambulance services in the area. The service target is validated by the expert judgment of emergency medical physicians. Thus, this community, with a population of 50,000, would require five ambulances.

Second, we determine the staffing pattern: let us assume it is agreed that each ambulance should carry two EMT's, and should be manned 24 hours a day, seven days a week.

Third, we decide upon the level of productivity: in this case, the output of emergency personnel is measured by the hours they are available to respond to emergency calls. Each EMT will man the ambulance for an 8-hour day, 40-hour week.

Finally, we calculate the manpower requirements: each ambulance will operate round-the-clock, a 168-hour week. Dividing 168 hours by a 40-hour week for each man equals four men. Multiplying by two men per shift equals eight men, which, when multiplied by five ambulances equals 40 men. Adding one EMT as a relief man gives the community's total manpower requirement for EMT's -- 41 men."<sup>18</sup>

#### STRENGTHS AND WEAKNESSES OF THE SERVICE TARGETS APPROACH

The strength of the service targets approach to estimating requirements is its focus on the central

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<sup>18</sup>U.S. Department of Health, Education and Welfare, Bureau of Health Planning and Resource Development, Methodological Approaches for Determining Health Manpower Supply and Requirements: Volume 1 Analytical Perspective, DHEW Publication No. (HRA) 76-14511, 1976, pp. 35-37.

issue of providing services, and therefore, on the importance of the efficient and effective organization of the delivery of care. Attention is directed to manpower utilization and its impact on productivity. The implications of the health team can be studied, allowing the planner to theoretically test the effect of alternative manpower mixes on manpower requirements.

The planner is directed by this method to do an in-depth analysis of each service component of health care and of the staff to provide the service. This disaggregation enables the planner to tailor his methodology according to the unique characteristics of the particular service sector.

In the area of manpower requirements for pharmaceutical services, for example, one must estimate the impact of the expanded use of drugs in medical practice; the shifting role of pharmacists away from drug compounding and dispensing, and toward advising and maintaining drug profiles; the relative importance of different employment settings -- pharmaceutical houses, drug stores, hospitals, HMO's; and the potential use of auxiliary personnel. A completely different set of considerations must be quantified in determining manpower requirements for radiologic technologists. First, the radiologist determines the diagnostic and curative use of X-ray and other radiation techniques. The use of radio-

logic services and of radiologic technologists depends upon the doctors' orders. New technology -- B-scan, holography, xerography -- expands the horizon, but the concern about health hazards will surely limit the use of radiologic services.

The search for understanding of the underlying factors and relationships that is required in the service targets approach is one of its greatest strengths. The planner is faced with the Achilles' heel of this method when he attempts to quantify the variables dealing with service targets, manpower staffing and productivity. He will almost certainly find important data gaps. Should he decide to collect primary data, he must be prepared for a long-term effort, considerable expense and the need for expert technical assistance.

The planner should be wary of the temptation to elaborate the study to such an extent that the detailed findings are only of academic interest and of no practical value in the light of his policy opinions.

By far the greatest danger of this method is the use of improper criteria for setting the service standards -- in terms of the demand for services and the productivity of labor. If the standards used are not valid, the estimates may be grossly unrealistic. In this, as in every other methodological approach, the final outcome is only as

good as the judgment and statistical data that are used.<sup>19</sup>

#### HEALTH NEEDS APPROACH

The health needs approach is used to ascertain what health services are needed by people to make and keep them healthy. The determination of "need" is made by health professionals in accordance with their best judgment as to what is required according to modern medical science. Needed services are then converted into manpower requirements.<sup>20</sup>

The data requirements are extensive: the extent of health needs must be identified; agreement on the proper modes of care and type of treatment for each health need must be reached; the appropriate treatment must be defined in terms of the personnel to deliver the service and the time needed for treatment; and the amount of service that the individual health worker can be expected to provide must be set.

The first step determines the health status of

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<sup>19</sup>U.S. Department of Health, Education and Welfare, Bureau of Health Planning and Resource Development, Methodological Approaches for Determining Health Manpower Supply and Requirements: Volume 11 Practical Planning Manual, DHEW Publication No.(HRA) 76-14512, 1976, pp. 48-49.

<sup>20</sup>World Health Organization, Pan American Conference on Health Manpower Planning, (Washington, D.C., 1973), p. 62.

the community; that is, the number and characteristics of people with specific incidences of prevalences of illness or disease -- or other requirements for health care services -- are quantified. In the second, the appropriate treatment of each disease and illness is specified in quantitative terms. The third specifies the amount of time it takes for the typical practitioner to provide each service; and the fourth calculates the number of hours in a year that the practitioner works.<sup>21</sup>

With quantitative statistics on the size of population, the frequency of illness, other health conditions, the services to be provided and the time required to deliver these services, the health needs can be defined as a basis for estimating manpower. The approach is sometimes viewed as an extension of the service targets approach in which targets are set by biological needs of the community. These needs for health services are translated into manpower requirements.

#### STRENGTH AND WEAKNESSES OF HEALTH NEEDS APPROACH

The logical coherences of the health needs method -- that manpower needs are determined by

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<sup>21</sup>U.S. Department of Health, Education and Welfare, Bureau of Health Planning and Resource Development, Methodological Approaches for Determining Health Manpower Supply and Requirements: Volume 11 Practical Planning Manual, DHEW Publication No. (HRA) 76-14512, 1976, p. 50.

health care required -- are very satisfying for health resources planners. One can easily conceptualize the analytical framework: types of health conditions, such as acute, chronic, preventive; required types of care, such as ambulatory, hospital-based, long-term; health occupations providing the care, such as physicians, nurses, therapists. When the community's needs are the proper criteria, and data on health status and appropriate treatment are obtainable, this approach is excellent.

The planner should be aware that the technical difficulties in defining and quantifying health needs, "acceptable" modes of care and manpower's output are formidable. Professionals do not agree; the health status of a population changes over time; medical practice advances; assignments of responsibility and functions of health occupation shift; and last, but not least, published statistics are out of date, inapplicable or incomplete.

Most serious of all, criticism is directed at the method's failure to take into account the patient's willingness to seek care and the community's ability to pay for health services. The assumption is that there are no financial, psychological or social constraints to seeking care. The concept of "demand as need" has the inherent danger of

overestimating manpower requirements.<sup>22</sup>

The methodological and practical difficulties inherent in this approach limit its use to tightly controlled health systems with an elaborate statistical base. Little is known about how various health manpower "mixes" in different nations relate to the prevalent morbidity in the population, and about the relative effectiveness of these systems in alleviating disease.<sup>23</sup> The approach is complicated, costly, requires sophisticated data, and is apt to result in costly projections of service requirements far in excess of ability to provide them.

#### ECONOMIC (EFFECTIVE) DEMAND APPROACH

The economic (effective) demand approach considers what health services are individuals and/or the government willing and able to pay for? This determination is generally based on past and present patterns of health expenditures.<sup>24</sup>

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<sup>22</sup>U.S. Department of Health, Education, and Welfare, Bureau of Health Planning and Resource Development, Methodological Approaches for Determining Health Manpower Supply and Requirements: Volume 11 Practical Planning Manual, DHEW Publication No. (HRA) 76-14512, 1976, p. 55.

<sup>23</sup>World Health Organization, Technical Report Series No. 481, The Development of Studies in Health Manpower (Geneva, Switzerland: World Health Organization, 1971) p. 17.

<sup>24</sup>World Health Organization, Pan American Conference on Health Manpower Planning, (Washington, D.C., 1973, p. 62.



Manpower requirements are derived from an estimate of the monies available from all sources to pay for care, including wages and salaries, or from an estimate of the services consumers are willing to buy, taking into account the tasks performed and the productivity of health personnel. Effective demand for manpower may be elicited from employers or analytically deduced from health expenditures or service utilization data.

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A variety of techniques may be used to calculate the economic effective demand and to convert this demand for services into manpower requirements. A survey of employers or an area skill survey is one approach. Another is to analyze empirical evidence of the utilization of services by population groups in relation to measures of disease or illness, personal income and other health system determinants. The most sophisticated techniques employ mathematical models, using regression analysis, mathematical

programming and simulation methodologies.<sup>25</sup>

STRENGTHS AND WEAKNESSES OF THE ECONOMIC (EFFECTIVE)  
DEMAND APPROACH

The strong suits of this method are its reliance on measures of effective demand -- the utilization rate -- and its detailed study of the behavior of groups of people seeking health care. The degree of disaggregation inherent in this method permits the planner to base his manpower estimate on the health care demands of each segment of the population, reflecting the cultural and physical characteristics of each group of people. This estimate represents the change likely to occur as a result of one important dynamic factor, namely, the change in population over time.

However, the assumption that other important economic factors, such as income, price and third party financing, remain unchanged is very limiting and unlikely to represent reality. The assumption that population and the demand for services are so related that a change in population brings a proportionate response in the demand for services is very restrictive and needs to be validated. Fur-

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<sup>25</sup>U.S. Department of Health, Education and Welfare, Bureau of Health Planning and Resource Development, Methodological Approaches for Determining Health Manpower Supply and Requirements: Volume 1, Analytical Perspective, DHEW Publication No. (HRA) 76-14511, 1976, pp. 41-42.

thermore, the assumption that present utilization patterns are the proper standard for the future is questionable.<sup>26</sup>

Other apparent weaknesses include a failure of taking into account the quality of services or their relevance to the health problems of the country. Even though this approach is concerned with economics, it can often be complicated, costly, and require extensive data.

#### FUNCTIONAL ANALYSIS APPROACH

Based in part on the assumptions of the cost-benefit and supply-and-demand approaches, functional analyses of health manpower have been concerned with ways in which the qualifications of personnel can be systematically matched to the requirements of job performance.

Although there have been numerous studies of what doctors, nurses, and allied health workers do in hospitals, often slowing down the work in the hospital -- the relationship between the tasks performed and their ultimate purpose has rarely been explored, and the extent to which programs have been designed or systems redesigned as a result of

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<sup>26</sup>U.S. Department of Health, Education and Welfare, Bureau of Health Planning and Resource Development, Methodological Approaches for Determining Health Manpower Supply and Requirements: Volume 11 Practical Planning Manual, DHEW Pub.No.(HRA) 76-14512, 1976, p.71.

activity studies is not known.

Analysis of the activities and functions of health workers also presupposes an established work routine and often a high level of skill in sampling to allow for institutional and temporal (daily and seasonal) variations -- conditions that are seldom met. Where they are met, it may not always be necessary to repeat such studies in detail because of the growing similarity in work routines. In other instances, it may be more important to increase the overall level of proficiency than to develop extensive profiles of activities. Conditions vary greatly according to the type of health worker concerned; for some categories relatively few studies have been undertaken as yet, and none has been thoroughly studied from the viewpoint of the functional division of labor in a given setting.

Another problem in functional and activity analyses of health workers is to decide what norms to use in evaluation, how to establish them, and who should collect the information. Data collection procedures used have included self-completed total estimates of activities, continuous self-logging of activities for a specified time, a "shadowing" or observational approach by an outside observer, and periodic spot checks on activities. These approaches may yield different profiles of work routines, and where two or more have been undertaken side by side, there has

not often been a high correlation of results.<sup>27</sup>

#### USE OF MODELS APPROACH

The uses and limitations of models in health manpower planning is only beginning to develop. In essence, a model is a low-cost and readily modifiable substitute for the real thing. To the extent that the variables used within the model accurately reflect and encompass the most important components of the system under consideration, whether the system be a health center, hospital, health region or health sector, manipulation of one or more variables can give the planner or administrator important indications as to how the rest of the system will react. In this way, it is possible to assess the implications for the system of alternative health policies.

Although extensively used in other disciplines, particularly in engineering, economics, and the physical and mathematical sciences, models have not yet been widely applied in the health sector. The types of model that have so far been used include morbidity models, demographic demand models, queueing models, and Markovian models. The information

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<sup>27</sup>World Health Organization, Technical Report Series No. 481, The Development of Studies in Health Manpower (Geneva, Switzerland: World Health Organization, 1971), p. 18.

base for a model may be obtained directly from the system that is under study (e.g., morbidity rates, utilization rates) or, in the absence of other sources, may represent little more than informed estimates. In either event, the final model will be no more accurate than the data used, so it is important to consider not only the absolute values of these data, but also the probable margin of error. By examining alternative models based on the upper and lower limits of the more important data items, the planner can appreciate the potential margin of error of the final results.

Models have been used increasingly in the general field of manpower planning, and on occasion in health manpower studies. Usually, only a portion of the health sector is included in the model; it is evident that much refinement and additional experience will be necessary before the maximum potential of models can be realized.<sup>28</sup>

Table One (pages 63-64) offers a comparison of the four most common approaches to health manpower planning. The name and description of each method is given along with advantages and disadvantages.

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<sup>28</sup>World Health Organization, Technical Report Series No. 481, The Development of Studies in Health Manpower, (Geneva, Switzerland: World Health Organization, 1971), pp. 18-19.

Prerequisites and appropriate situations where each method should be used are included in the table.<sup>29</sup>

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<sup>29</sup>Thomas L. Hall, Estimating Requirements and Supply: Where Do We Stand, Address given at Pan American Conference on Health Manpower Planning, 10-14 September 1973, Ottawa, Canada, Published by World Health Organization, Washington, D.C. 1974, pp. 64-65.

Table I

Major Methods for Assessing and Projecting Manpower Requirements.<sup>29</sup>

| <i>Name and description of the method's principal variants</i>   | <i>Potential advantages</i>   | <i>Potential disadvantages</i>   | <i>Prerequisites and appropriate country situations</i>   |
|--|---|--|---|
| <p><i>Health manpower: population ratios (ratio method):</i> This method involves the identification of a suitable health manpower: population ratio for a future point in time and then the application of this ratio to the projected population to derive manpower requirements. Many different methods have been used to derive the desired ratios. These include:</p> <ol style="list-style-type: none"> <li>1. International comparisons.</li> <li>2. Maintaining the current situation.</li> <li>3. Use of "recognized" standards.</li> <li>4. Adoption of the ratio currently observed in a favored portion of the country.</li> <li>5. Construction of a model using one of the other methods, conversion of the requirements into a ratio, and adoption of this as the standard.</li> <li>6. Extrapolation of past ratio trend lines.</li> </ol>                     | <p>Easy to use and to interpret.</p> <p>Data requirements usually modest and not very sensitive to errors within the validity of the underlying assumptions.</p> <p>If current situation is judged adequate, maintenance of status quo is a defensible policy.</p>  | <p>Easy to select unrealistic ratios resulting in major errors in economic and manpower policies.</p> <p>Tends to be used with single occupational categories with risk of ignoring potential improvements in utilization through changed interpersonnel ratios.</p> <p>Some methods of selecting a ratio cannot help but show a manpower shortage.</p> <p>Provides little insight into the dynamics of demand.</p> <p>With primary emphasis on manpower, little attention may be given to services (kind, quality, volume, frequency, distribution, and relevance).</p> | <p>Realism and candor, even more than with the other methods.</p> <p>Of greatest use in countries with: public or private sectors; reasonably adequate health services delivery system, and health situation; limited planning resources; passive or active health policies, though the latter requires fairly strong control over the health system.</p> |
| <p><i>Service targets approach (normative approach):</i> This method emphasizes the development of detailed standards for the provision of different kinds of services, standards which are then used to derive targets for the production of these services. Manpower staffing and productivity standards are then used to convert service targets into the manpower required to attain them. Various methods can be used to develop the service standards, including those used in the health needs and to a lesser extent, the manpower: population ratio methods. Other techniques for developing standards include:</p> <ol style="list-style-type: none"> <li>1. Task and functional analysis.</li> <li>2. Empirical experience.</li> <li>3. Professional judgment.</li> <li>4. Internationally recommended standards.</li> <li>5. International comparisons.</li> </ol> | <p>Permits a disaggregated approach in which the most suitable methods and standards are used for each component activity of the sector.</p> <p>With primary emphasis on "services," not "manpower," attention is naturally directed toward productivity, interpersonnel ratios and efficient resource utilization.</p> <p>Facilitates closer adjustment of delivery to needs and demands.</p> <p>Relatively easy to interpret rationale to others.</p> <p>Cost estimation relatively easy.</p> | <p>Method is prone to having standards based more on desires than on reality, leading to major policy errors.</p> <p>The logic of the method invites excessively detailed planning for segments of the sector not subject to tight control.</p>  | <p>Modest data and planning capability requirements.</p> <p>Of greatest use in countries with: dominant public sector; activist government policies toward development and provision of health services; adequate governmental control over health services delivery system.</p> <p>Can be readily used in conjunction with other methods.</p>            |

<sup>29</sup> Source: Thomas L. Hall, Estimating Requirements and Supply: Where Do We Stand, Address given at Pan American Conference on Health Manpower Planning, 10-14 September 1973, Ottawa, Canada. Published by World Health Organization, Washington, D.C. 1974, 64-65.



Table I (continued)

Major Methods for Assessing and Projecting Manpower Requirements.<sup>29</sup>

| <i>Name and description of the method's principal variants</i>   | <i>Potential advantages</i>  | <i>Potential disadvantages</i>   | <i>Prerequisites and appropriate country situations</i>   |
|--|--|--|---|
| <p><i>Economic demand (or, "effective economic demand")</i>: This method concerns the measurement and projection of what health services people are willing and able to pay for, irrespective of the quality of the specific services obtained or of their need for them. The services demanded tend to be curative in nature and to be provided predominantly through the private sector, with or without the intervention of third party reimbursement mechanisms. The method consists of correlating the receipt of services with selected economic and other variables, and then of projecting the changes likely to occur regarding these variables in order to derive the impact of these changes on the demand for services, and ultimately on health manpower requirements. Variants include:</p> <ol style="list-style-type: none"> <li>1. Constant utilization rates for a changing population.</li> <li>2. Population and income.</li> <li>3. Trend in expenditures.</li> <li>4. Job vacancies.</li> <li>5. Relative earnings.</li> <li>6. Rate of return.</li> </ol> | <p>Helps describe dynamics and determinants of health services utilization.</p> <p>Tends to produce economically realistic projections.</p> <p>Allows for disaggregation of various components of demand.</p> <p>Probably provides a good estimate of the minimum growth in demand and ensures that the level of future satisfaction at least equals present satisfaction.</p> <p>Some variants of this approach are quite simple.</p> <p>May provide useful information for comparing returns from training for health occupations with those of other sectors.</p> | <p>May be complicated, costly and require sophisticated data.</p> <p>Ignores many political and societal reasons for improving the distribution of health services.</p> <p>Does not necessarily take into account the quality of services or their relevance to the health problems of the country.</p> <p>May neglect consideration of ways to improve manpower productivity.</p> <p>Hard to interpret to health sector authorities and to the public.</p>  | <p>Requires sophisticated data and technical expertise in some cases.</p> <p>Of greatest use in countries with: large private sector; relatively limited and/or passive government involvement in the provision of health services; relatively small urban-rural, rich-poor, and other imbalances in the utilization rate of services.</p> <p>Can usefully complement other methods of manpower estimation.</p> |
| <p><i>Health needs (or, biologic needs)</i>: This method seeks to determine, based on expert opinion and taking into account available technology, what kinds, amounts, and quality levels of services are required to attain and maintain a healthy population. Service targets are then converted into manpower requirements by means of staffing and productivity standards. Considerations of service costs and distribution are of secondary importance.</p>  | <p>Appealing logic of method.</p> <p>Permits allocation of resources where they will have greatest effect on health; can focus on ways to improve utilization.</p> <p>Fulfills health ethic of providing services according to need and not to social or economic condition of consumers.</p> <p>Provides ultimate or maximum goal for the provision of services.</p> <p>Particularly suited to high priority categorical programs.</p>  | <p>Complicated, costly, and requires sophisticated data.</p> <p>Logic of method may require excessively detailed planning and frequent updating of standards in accord with developing technology.</p> <p>Continued wide divergence among experts on "best" methods to treat many disease conditions.</p> <p>Apt to result in costly projections of service requirements, far in excess of ability to provide them.</p> <p>Presupposes tight governmental control over health services delivery system and high level of health consciousness in the population.</p> | <p>Requires sophisticated data and technical expertise.</p> <p>Of greatest use in countries with: relatively large public sector; active government commitment to improving and shaping health services delivery; tight government control over health system; high level of health consciousness of people.</p> <p>Useful in defined public health or other categorical health programs.</p>                   |

<sup>29</sup> Ibid.

CHAPTER III

Hospital Manpower Planning

(Developing Manpower and Staffing Guidelines in Hospitals)

Hospital visits are increasing at a rate unsurpassed in almost every province and state in both Canada and the United States. Today, the hospital is America's fastest growing business.<sup>1</sup> Parallel with this is the rising cost of supplies, equipment, etc. From 1966 to 1977, the cost of a pair of bandage scissors almost tripled, from \$5.00 to \$14.00.<sup>2</sup> Hospital and health care personnel are no exception. Between 75 and 80 per cent of a hospital's budget goes to staff salaries and paid working hours in the hospital.<sup>3</sup> The cost of labor in hospitals has risen sharply over the past ten years. The starting salary for a Nursing Assistant working for the Veterans Administration Hospital System (America's largest chain of hospitals) in 1968 was \$5,565.00. Today, that figure reads \$10,049.00. Ten years ago, a Dietitian's starting salary was \$6,734.00. Today, Dietitians start between \$13,925.00 and \$17,035.00.<sup>4</sup> The cost has nearly doubled during the past decade.

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<sup>1</sup>Hospital Affiliates International, Inc., "How to Cope with Running the Toughest Business in America," Trustee, May 1978, Vol. 31, No. 5, p. 42.

<sup>2</sup>Ibid.

<sup>3</sup>U.S. Department of Health, Education and Welfare, Social Security Bulletin, Vol. 40, No. 1, 1977, Washington, D.C.: U.S. Government Printing Office, 1977, p. 38.

<sup>4</sup>U.S. Civil Service Commission, Salary Table No. 48, Washington, D.C.: U.S. Government Printing Office, 1980.

Not only have budgets for staff increased, but the number of staff to operate a hospital has also increased. As discussed in Chapter One, sophisticated equipment, hospital accreditation, and patients themselves have all affected manpower and staffing guidelines in hospitals. Not only newly built facilities, but hospitals undergoing extensive remodeling and construction also require planning in terms of manpower. We can take the example of a hospital planning to open up one or two wings or planning to add an entire new building. The manpower planner is faced with many decisions. He must know how many new patient beds he will have. He must be able to forecast or anticipate the number of new lab requests, X-rays, etc. that the new addition will require. The planner must be able to consider how many nurses will be required for the extra beds; he must know if he will need more ward orderlies, ward clerks, cleaning personnel, etc..

One of the more difficult questions the manpower planner must consider is, how fast will the number of patients increase to fill the new beds? Will the increase be slow and begin with only a trickle of patients, or is the expansion needed so much that the new beds will be filled rapidly? The planner must consider the possibility of difficulties in recruiting new staff for the addition. If difficulties arise, should the staff be built up prior to the open-

ing? Should the ward or building open under-staffed and only run at part capacity? How long will it take before a full complement of staff is obtained and the hospital is able to operate at full capacity? If the planner elects to build up the staff prior to the opening, he must consider the loss of employing staff who are under-utilized. He must not only look at the monetary factors, but others as well. If staff are temporarily deployed, morale may drop and false expectations of the future workload may develop. Looking at the situation in another direction, if the manpower planner opens the new ward or building without the proper number of staff, he will be under-utilizing the expansion. If the expansion took large amounts of capital investment, the costs of under-utilizing the expansion may outweigh the costs of employing staff prior to the opening. Another problem the planner must consider is the possibility of a high wastage or turnover rate of new employees to a ward under-staffed. This can produce high costs and inefficiency.<sup>5</sup>

Manpower planning in hospitals is a vital issue in today's world of health care. With the rapidly growing number of new and expanding hospitals, and as hospital departments become more productive, the

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<sup>5</sup>Estimating Manpower Requirements - A Background Paper by the U.S. Department of Health, Education and Welfare, Washington, D.C.: U.S. Government Printing Office, 1977, p. 19.

need is further enhanced. With the increasing utilization of hospitals by the United States (and Canadian) population and the impact of Medicare for persons 65 years of age and over, current knowledge of the demand for health manpower in hospitals has become critical.<sup>6</sup>

The purpose of this chapter is to take a close look at manpower planning and the development of staffing guidelines in hospitals. The following departments will be given attention: Admitting, Business Office, Dietary, Housekeeping, Medical Records, Nursing, Radiology, and Social Work. A brief description of each department's purpose and responsibilities will be given. The discussion on each department will include a list of functions, procedures, etc., that one must pay attention to when establishing manpower and staffing guidelines. A list of possible staff or position titles will also be included for each department.

The main criteria in developing these guidelines is to develop labor performance standards. This is accomplished by listing all procedures, examinations, functions, etc., (both constant and non-constant) performed in each department. A list of functions

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<sup>6</sup>Garrie J. Losee and Marion E. Altenderfer, Health Manpower in Hospitals, Washington, D.C.: U.S. Government Printing Office, 1970, p. 1.

or activities performed by clerical, file room, and related staff is necessary to determine staffing needs for the entirety of each department. This list should include not only current activities, but goals and future plans that may increase or decrease functions of each department. A standard completion time for each function, task, examination, etc. is determined. Adjustments to times can be set by developing an aggregate standard. This aggregate then becomes the standard time allowed to complete the examination, function, etc..

Time standards are needed to establish guidelines and provide adequate staffing for all workload situations. Staffing for peak workloads, as well as other periods including absences and vacations, are likely to be more accurate if labor performance standards are set.

In developing staffing guidelines, the following positions and tours of duty should not be overlooked to make the guidelines more meaningful:

1. Supervisory personnel
2. Technical staff
  - a. Weekday day shift
  - b. Weekday evening shift
  - c. Weekend shifts
3. Non-technical staff
  - a. Receptionist-clerk typist
  - b. File room personnel

## c. Transcriptionist

A six to eight-week period of studying frequency data is normal for job engineering projects in hospitals.<sup>7</sup> Time standards for the majority of activities or procedures can be developed through direct observation. Frequency data for lower volume functions can be derived from past records and logs that are maintained. Appropriate allowances will probably be necessary in certain circumstances. Once the activity frequencies have been determined, they are multiplied by the corresponding time standards to determine the workload by day and shift. This is then converted into the actual manpower and staffing guideline.

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<sup>7</sup>Personnel interview with Larry Grandia, Director of Management Systems, Intermountain Health Care, Salt Lake City, Utah, July 6, 1978.



## THE ADMITTING DEPARTMENT

The Admitting Office is responsible for determining the patient's eligibility for admission to the hospital. The Admitting Office evaluates each applicant in terms of stated purposes of the hospital; controls numbers of patients admitted and room assignments; admits patients to various services promptly, graciously and in an orderly manner; maintains records of patients awaiting admission and those already in the hospital; and develops confidence in and understanding of activities of the hospital by the patient and the general public.

Admitting functions revolve around admitting, transferring, and discharging patients. Rereadmission reservations for accommodation are made at the request of a member of the medical staff, except for emergency patients who are admitted in accordance with existing policy. Personal, financial and statistical information are obtained from the patient or relative. The patient is informed about activities and rules of the hospital, and is referred or escorted to accommodations. All departments concerned with care, treatment, diagnosis, or record-keeping are notified of the patient's admission. It may be the assigned responsibility of the Admitting

Office to schedule use of operating room facilities, and give routine information concerning condition of patients.

FUNCTIONS, ACTIVITIES OR PROCEDURESADMITTING DEPARTMENT

Number of Admissions

Number of Clinics

Number of Clinic Appointments

Patients transferred to other hospitals

Number of outpatient visits

Number of Emergency Room visits

POSITION OR STAFF TITLESADMITTING DEPARTMENT

Admitting Supervisor

Admitting Clerks

Pre-Admitting Clerks

Switchboard Operators

Cashiers

Clinic Clerks

Scheduling Clerks

## BUSINESS OFFICE

The purpose of the Business Office is to manage the hospital's financial activities and keep administration informed of financial conditions for purposes of hospital planning and control. The Business Office also works close in relation to admitting patients in accordance with fiscal policies and regulations established by the governing authority of the hospital.

The Business Office is responsible for the financial activities of the hospital which encompass receipt of revenues, expenditure of funds, and conservation of hospital assets. As a basis for performing these and related administrative functions, this department maintains extensive accounting and statistical records. It records all financial transactions including control of cash, income and expense, purchase and disposal of capital assets, estimates cost of free service rendered indigent patients, and related transactions. The responsibility includes development of payroll records and payment of salaries.

Another function of the Business Office is to prepare budgets for ensuing fiscal periods. Many factors are considered in the preparation of a

budget including estimated needs of various departments, departmental expenses of previous periods, anticipated patient census and income, and general economic and market conditions.

Similarly, the Business Office is responsible for preparation of reports of departmental income and expenses, and comparisons of gross earnings and costs of revenue-producing departments. Such reviews and reports are of assistance in setting rates. The department is also responsible for preparation of all reports to outside agencies. Most important, are reports for cost reimbursement purposes which can derermine the hospital's financial position.

The department may have responsibility for developing administrative systems and procedures; this can include responsibility for the data processing function, if one exists.

In most hospitals, the Business Office has the responsibility for determining a patient's ability to pay established rates for services, and making necessary financial adjustments if patient cannot meet his full obligation. This credit function includes the responsibility for collecting unpaid bills.

FUNCTIONS, ACTIVITIES OR PROCEDURESBUSINESS OFFICE

Vouchers processed

Invoices processed

Payroll cards processed

Pay checks processed

Bills processed to:

Individuals

Insurance Companies

Medicare

Medicaid

Other

POSITION OR STAFF TITLESBUSINESS OFFICE

Controller

Business Office Manager

Manager for Credit and Collection

Collection Clerk

Chief Accountant

Accountant

Audit Clerk

Bookkeeper

Cashier

Accounting Clerk

Accounts-Receiveable Clerk

Invoice-Control Clerk

Insurance Clerk

Payroll Clerk



## DIETETIC DEPARTMENT

The purpose of the Dietetic Department is to provide complete dietetic treatment to all patients, including patient education; and to plan, prepare and serve nutritious and appetizing food for patients, personnel and visitors; to train dietetic and other hospital personnel, and to maintain close working relationships with other hospital activities and community agencies.

Responsibility for this department includes planning, organizing and directing all phases of the dietetic operation which includes menu planning; food preparation and service; budget estimates; cost control and administrative record-keeping; patient education; analysis and appraisal of personnel requirements; and safety and sanitation programs. The department is responsible for keeping informed of advancements and changes in equipment and food for possible application.

It is the responsibility of the Dietetic Department to specify quantity and quality of food through use of commodity specifications. Meals must supply basic physiological needs and also have aesthetic appeal to the patient. For efficiency in operations, all diets can be built around general diets by ad-

ditions and modifications.

Files of recipes for quantity cooking are maintained to facilitate preparation and cost control. The recipes should contain formulas to be followed and indicate yields in terms of number and size of servings, and costs of both total recipe and single servings. A diet manual prepared or recommended by the department and approved by the medical staff, must be available for use by physicians and nurses.

Food preparation and service constitute a large part of the work of the Dietetic Department. All foods should be prepared under strictly sanitary conditions, in accordance with local and State public health regulations. Foods should be prepared preserving full color, flavor, and nutritional value; meals should be attractively served. Trays must be inspected so that patients on modified diets will receive proper meals. Dishwashing and housekeeping in main kitchen, floor kitchen, and other dietetic areas usually are also functions of this department.

Another function is that of formal and informal education. Dietetic interns are trained in many hospitals. Nurses, medical and dental students, and interns and residents are instructed in principles of nutrition and diet therapy. The department is also responsible for teaching patients and

their families nutrition and modified diet requirements.

Infant formulas may be prepared by the Dietetic Department or pre-prepared formulas purchased from vendors.

Other dietetic services include visiting patients in nursing units to determine their food preferences both as to type of food and manner in which it is prepared; advising patients with special dietetic problems prior to their discharge from the hospital, or as referred from the outpatient clinic; cooperating with medical staff in planning, preparing and serving metabolic research diets.

Dietetics is an important aspect of the hospital medical care. To be effective, the Dietetic Department must develop a planned program, efficient organization and administration, and close coordination with other hospital activities. The program must be flexible enough to take advantage of current developments in medicine, dietetics, and the food service industry.

FUNCTIONS, ACTIVITIES OR PROCEDURESDIETETIC DEPARTMENT

Number of meal days provided by hospital

Number of meal days purchased from private sources

Type of hospital services

Number of hospital services

Number of Interns

Number of Residents

Number of Volunteers

Number of Dining Rooms

Number of outpatients requiring dietetic counseling

Number of inpatients requiring dietetic counseling.

POSITION OR STAFF TITLESDIETETIC DEPARTMENT

Director, Food Services

Chief Dietitian

Dietitian - Teaching

Dietitian - Administrative

Dietitian - Therapeutic

Dietetic Clerks

Food Production Supervisor

Dining Service Manager

Dining Service Worker

Baker

Cook

Salad Preparer

Dessert Preparer

Patient Food - Supervisor

Patient Food - Worker

Pot Scrubber

Dish-sorter and Washer

## HOUSEKEEPING DEPARTMENT

The purpose of the Housekeeping Department is to maintain the hospital facilities in a clean, sanitary, orderly, and attractive condition; to provide a suitable environment for the care of patients and for the work of the hospital staff and employees.

Clean, sanitary, pleasant environment and facilities are essential to medical and nursing care of patients and to hospital staff. The responsibility for providing such surroundings in as economic a manner as possible falls in a large measure upon the housekeeping staff of the hospital. Housekeeping is a complex activity requiring constant attention to many different details, and to an overall plan which provides for the utilization of personnel, procedures, and material in an efficient and effective manner.

More specifically, responsibilities of the Housekeeping Department include:

1. Establish and maintain a regularly scheduled cleaning program throughout the hospital complex. Patient-care areas, intensive care units, surgical suites, and other specialized areas require that a high level of sanitation and sterili-

zation be maintained.

2. Recruit, select and train personnel for this purpose.
3. Study new techniques for improving housekeeping services; evaluate, select, and provide proper equipment and supplies for efficient and economical operation of the housekeeping services.
4. Provide qualified supervision and direction to scheduled work activities resulting in the most effective utilization of manpower.
5. Establish and maintain procedures which will insure acceptable standards of quality. This includes routine cleaning of windows, walls, floors, fixtures, and furnishings, as well as responsibility for disposal of ordinary and contaminated refuse; disinfection of contaminated areas; pest and rodent control; taking bacteriological surface samplings; and carrying out pertinent infection-control procedures.
6. Utilize good interior design principles with regard to decorating and choice of furniture and furnishings, and attend to furniture repairs, refinishing, and upholstering, or replacement of equipment

and supplies. May move and relocate furniture.

7. Maintain linen selection, distribution, control and repair.

8. Be aware of common safety precautions and correct or report safety hazards to the correct authority.

9. Coordinate department activities with those of all other departments.

10. Report building repair needs to the Engineering and Maintenance Department.

The Housekeeping Department may also be responsible for the following services: hospital security; elevator operation; operation of the laundry; and control of service contracts for services provided by non-hospital personnel.



FUNCTIONS, ACTIVITIES OR PROCEDURESHOUSEKEEPING DEPARTMENT

Number of square footage

Frequency of cleaning

Types of cleaning:

Dust mop

Damp mop

Waxing

Vacuum

Polishing

Size and number of individual offices

Size and number of corridors

Number of windows

Number of rest rooms

Number of bed changes and cleaning

Size and frequency of wall washing

Number of staff dressing rooms

Frequency and areas where pest control is undertaken

POSITION OR STAFF TITLESHOUSEKEEPING DEPARTMENT

Director, Housekeeping

Housekeeping Supervisor

Housekeeping Attendant

Housekeeping Aide

Wall Washer

Window Washer

Linen-Room Aide

Seamstress

Dusting-Vacuuming Aide

Electric Scrubber/Polisher Operator

Pest Controller

Bed Cleaner

## MEDICAL RECORDS DEPARTMENT

The main purpose of the Medical Records Department is to provide a central file for medical records, which document the course of a patient's illness and treatment during a particular episode as an inpatient or outpatient. As such, it is an important goal in the practice of medicine since it serves as a basis for planning patient care, evaluating care, and providing a means of communication between the physician and other professional groups in contributing to the patient's care. The secondary purpose may be to protect the legal interests of the hospital and the physician, and to provide clinical data of interest to researchers and clinical data research systems.

The department is responsible for maintaining a medical record, which is a complete case history or written report pertaining to each patient. The record should include identification data, chief complaint, past medical history, family history, history of present illness, results of physical examination, and provisional diagnosis; consultations and other special reports; clinical laboratory, pathology, and X-ray findings; medical and surgical treatment; physicians' orders; progress notes; final diagnosis; condition on discharge and

followup records; report of autopsy, if performed; and nurses' graphic charts.

The department receives the medical records, performs a quantitative analysis on the content, and refers incomplete records to responsible physician or department head for completion. It also reviews clinical records received from patients transferred from other hospitals and records received from patients transferred from other hospitals, and initiates action to obtain missing data.

The department maintains and indexes records in accordance with standards established by the Joint Commission on Accreditation of Hospitals of the American Hospital Association. These include a patients index, filed alphabetically by patients' names, containing name of the patient, attending physician, date of admission and file number; index of diseases, filed according to the Standard Nomenclature of Diseases and Operations, or by another accepted system; index of operations, which permits study of all patients in the hospital for any specific type of operation; physicians' index, containing physician's name, file number of the patient, and end results; and an index of end results which can be arranged according to classifications such as elective, emergency, and palliative.

The Medical Records Department provides analysis and technical evaluation of clinical records. Also,

it is assigned the function of preparing a daily census, as well as monthly and annual statistical reports of services to patients, in order to assist the staff in evaluation and improving professional work of the hospital. The department may make group studies of diseases and collect scientific data from literature for use by the medical staff. In addition, since the medical record has great value in legal defense to both physician and hospital, the librarian is occasionally called to present medical records in court.

FUNCTIONS, ACTIVITIES OR PROCEDURES

MEDICAL RECORDS DEPARTMENT

Number of patients admitted

Number of patients discharged

Number of records requested

Number of research requests

System of record keeping

System of coding records

System of maintaining statistics

Length of stay on each patient

Number of exams, tests, etc. performed on each patient

Number of requests for records by:

Individuals

Law firms

Insurance companies

Physicians

Other

POSITION OR STAFF TITLESMEDICAL RECORDS DEPARTMENT

Medical Record Librarian  
Medical Record Technician  
Medical Record Clerk  
Transcription Supervisor  
Medical Transcriptionist  
File Room Supervisor  
File Room Clerk  
Correspondence Clerk  
Abstract Clerk  
Coding Clerk  
Insurance Clerk  
Microfilm Supervisor  
Microfilm Clerk

## NURSING SERVICE DEPARTMENT

The purpose of Nursing Service is to provide safe, efficient and therapeutically effective nursing care.

The basic responsibility of the department is to care for the patient. The Nursing Service Department carries out its functions according to the philosophy, objectives and policies of the hospital established by the governing authority. Within this framework the department's functions include:

1. To provide and evaluate nursing service for patients and their families in support of medical care, as directed by the medical staff.
2. To define and carry out the philosophy, objectives, policies and standards for nursing care of patients and related nursing services.
3. To provide and implement a departmental plan of administrative authority which clearly delineates responsibilities and duties of each category of nursing personnel.
4. To coordinate the department's functions



with the functions of all other hospital departments and services.

5. To estimate the department's requirements and to recommend policies and procedures to maintain an adequate and competent nursing staff.

6. To provide the means and methods by which the nursing personnel can work with other groups in interpreting the objectives of the hospital and nursing service to the patient and community.

7. To participate in the formulation of personnel policies, interpret established policies, and evaluate their effectiveness.

8. To develop and maintain an effective system of clinical and administrative nursing records and reports.

9. To estimate needs for facilities, supplies and equipment, and to establish an evaluation and control system.

10. To participate in and adhere to the financial plan of operation of the hospital.

11. To initiate, utilize and/or participate in studies or research projects for improving patient care and other administrative and hospital services.

12. To provide and execute a program of continuing education for all nursing personnel.

13. To participate in and/or facilitate all educational programs which include student experiences in the Nursing Service Department.

The special nursing units in the Nursing Service Department usually include medical, surgical, pediatric, obstetric, and psychiatric. In addition to the overall responsibilities and functions of nursing service, the units also carry more specific responsibilities and functions of patient care, varying with each nursing unit. The establishment and execution of educational programs for staff and student nurses are functions of these special nursing units.

Medical and Surgical: Nursing care is provided in medical and surgical units in accordance with physician's instructions and recognized techniques and procedures. While medical conditions are not easily divided into distinct categories, medical nursing is considered a specialty in that normal and abnormal reactions or symptoms of diagnosed diseases must be recognized and reported. The patient with a stroke or a cardiac condition requires a much different type of nursing from that given the patient with an ulcer or diabetes. Surgical patients also require special pre-operative and post-operative

care.

Pediatrics: This service embraces the care of children. Care of the newborn is usually in a separate unit located in the obstetric unit. The activities of the pediatric unit require understanding of the unique needs, fears and behavior of children, which is reflected in the type and degree of nursing care given. Where illnesses require protracted convalescence, educational and occupational therapy become concerns of the nursing service. Relationships with parents pose further important responsibilities.

Obstetrics: Prenatal care, observation and comfort of patients in labor; delivery room assistance; and care of mother after delivery, as well as nursing care of the newborn, are important responsibilities of this unit. Obstetric nurses assist in instructing new mothers in post-natal care and care of the newborn. Care of the newborn, particularly the premature, requires special nursing skills dictated by their unique requirements.

Psychiatric: While most emotionally disturbed patients are treated in specialized hospitals, the general hospital also recognizes a responsibility and provides facilities for the mentally ill. Nursing care of the mentally ill requires a knowledge of their various behavior patterns and how to cope with them. Techniques must be learned for dealing with all types of problem behavior, so that skilled, ther-

apeutic care is given to such patients. Family and community education is also an important function of the psychiatric unit.

Other special units within the Nursing Service Department are Operating Room, Recovery Room, Emergency Room, and the Intensive Care Unit.

Operating Room: This unit has primary responsibility for comforting patients in the Operating Room; maintaining aseptic techniques; scheduling all operations in cooperation with surgeons; and determining that adequate personnel, space, and equipment are available. Nursing personnel assist the surgeon during operations and are part of the surgical team. Preparation for operations includes sterilization of instruments and equipment; cleaning up after operations is also part of the unit's responsibility.

Recovery Room: In many hospitals, the Recovery Room unit is an adjunct responsibility of the Operating Room unit. Special nursing attention must be given patients after an operation until they have completely recovered from the effects of the anesthesia.

FUNCTIONS, ACTIVITIES OR PROCEDURESNURSING DEPARTMENT

The development of manpower and staffing guidelines in nursing takes in several variables. The type of hospital (Pediatric, Psychiatric, Extended Care, General Medical and Surgery), number of beds and types of services offered are primary considerations when establishing these guidelines. Once the type of hospital and number of beds have been identified, the following components must be completed to ensure more accurate staffing guidelines:

1. Developing a patient classification or mix:

The need for nursing care services depends on the type of patient. Age, sex, diagnosis and current inpatient condition are all variables that relate to patient needs and the manpower requirements to fulfill these needs.

2. Develop time standards: Time standards

should be done in the form of how many minutes a particular nurse (RN, LPN, etc.) will spend on a patient or patients in each classification during one day, evening, or night shift.

3. Converting time standards to manpower: Time

standards are converted to the total number of staff needed by taking the total number of minutes each nurse will spend on different patients with different classifications into the appropriate staff levels and skills needed for each unit or ward and on each shift.

The following are functions, activities or procedures performed by the nursing staff:

Ambulate, Dangle, Exercise

A.M. Care

Assist Patient into Bed, Chair, Commode

Back Rub

Bathroom Attended

Bed Change

Bed Pan: Give & Empty

Blood Pressure Check

Call System

Calming Measures

Clean-up Patient Room

Diaper: change

Force Fluids

H.S. Care

Intake & Output

Linen: Disposal

Medications: Oral

Medications: Subcutaneous

Medications: Intramuscular

Medications: Intravenous

Nourishments: Prepare & Pass

Position Bed

Pre-Meal Care

Rounds: Charge Nurse

Rounds: with Doctor

Routine Patient Check

Temperature, Pulse, Respiration

Trays: Pack and Pick-up

Turn, Cough, Deep Breath

Urinal: Give and Empty

Vital Signs Check

Water: Deliver & Refill

Ace Bandage: Apply, Remove Wrap

Admission of Patient to Unit

Bath: Bed/Complete

Bath: Bed/Partial

Bath: Tub or Sitz/Attended

Bath: Tub or Sitz/Unattended

Bath: Shower/Attended

Bath: Shower/Unattended

Bath: Infant

Bed Making/Occupied

Bilirubin Light

Binders

Blood Sugar Test

Blow Bottles

Breast Feeding Instructions

Cast: BiVale

Catheter: Irrigation

Catheter: Remove

Catheterization: Female

Catheterization: Male

Check Circulation of Patient

Check Valuables

Circumcision

Circumcision Care

Clinitest

Crib: Change Linen

Crib (warmer): Cleaning

Colostomy-Ileostomy Care

Colostomy: Irrigation

Croupette Care

Deliver Supplies

Dermatitis Treatment

Discharge Patient

Drainage Systems

Dress Patient/Infant

Dressing Change: Dry

Dressing Change: Moist

Douche

Elastic Stockings

Emesis Basin

Empty Trash

Enema: Disposable (Fleets)



Expiration

Feed: Cut and Assist

Feed: Infant

Feed: Spoon

Gastric Analysis

Handwashing

Heart Monitor: setup

Hemovac

Hypothermia

Incontinent Care

IPPB

Irrigate Wound

Isolation Technique: gown, glove

Isolette Care

I.V.: Additive

I.V.: Discontinue

I.V.: Maintain

I.V.: Start

Levine Tube: Discontinue

Levine Tube: Irrigation

Levine Tube: Maintain

Levine Tube: Passing & Suction

Menu Assistance

NPO: begin

O.B. Packet: Distribute

Oral Hygiene

Oxygen: Start

Oxygen: Maintain

Packs: Cold Ice  
Packs: Hot  
Pelvic Exam  
Peri and Abdomen Check  
Peri Care  
Pictures: Baby  
PKU Testing  
Post Mortem Care  
Postrial Drainage  
Prep: Surgery or other  
Proct. Exam  
Restraint: Posey Belts, wrist  
Shampoo  
Shave, Facial  
Skin Care  
Specimen Collection: Clean Catch  
Specimen Collection: Skin Culture  
Specimen Collection: Sputum  
Specimen Collection: Stool  
Specimen Collection: Urine  
Specimen Collection: 24 Hour Urine  
Spinal Tap  
Stool Specimen for Guaiac  
Suction P.R.N.  
Teaching Patient  
Telemetry  
Temperature Monitor: Setup  
Tracheotomy Care

Traction: Disassemble

Traction: Maintain

Traction: Set up

Transfer: Another Unit

Transfer: Within Unit

Transfusion

Transfusion: Exchange

Transport: Another Department

Transport: Baby to Mother

Transport: Baby to Nursery

Weigh: Baby Scale

Weigh: Bed Scale

Weigh: Floor Scale

POSITION OR STAFF TITLESNURSING SERVICE DEPARTMENT

Director, Nursing Service

Assistant Director, Nursing Service

Nursing Supervisor - Day

Nursing Supervisor - Evening

Nursing Supervisor - Night

Head Nurse

Staff Nurse

Licensed Practical Nurse

Registered Nurse

Nursing Aide

Ward Clerk

Ward Orderly

Director, In-Service Education

Instructor - Nurses In-Services

Instructor - Ancillary Nursing Personnel

## RADIOLOGY DEPARTMENT

The purpose of the Radiology Department is to provide an adjunct diagnostic and therapeutic radiology service as required in examination, care and treatment of hospital patients.

Basic responsibilities include taking, processing, examining, and interpreting radiographs and fluorographs. Radiographs may be taken for diagnostic purposes, or to study physiological processes. Fluoroscoping may be done to study action of internal physiological processes, localize foreign bodies, or for related medical purposes. Radioisotopes are used to indicate the course of compounds introduced into the human body. Radiographs and fluorographs must be examined, and the extent and significance of their pathology or deviation from the normal interpreted. Roentgenotherapy and therapy by radium and radioactive substances are also a responsibility of this department. In large research or teaching hospitals there may be a separate Department of Nuclear Medicine concerned with medical diagnosis and therapy through the use of radioisotopes, as well as research in radiochemical analysis, radiation biology research, instrumentation and monitoring techniques, radioactive waste disposal, control and reduction of

occupational and environmental exposures, and special health problems of nuclear propulsion.

In addition to these functions, the department is responsible for planning and carrying out policies and procedures to insure protection to all hospital personnel in contact with radiation modalities; providing consultation and advice to clinicians in interpreting diagnostic roentgenological findings; planning diagnostic X-ray procedures and other pertinent matters; administering therapeutic treatment; participating in research programs; presenting films at autopsies and making additional post-mortem examinations as required to complete records; participating in hospital's education program; and maintaining accurate and complete records.

FUNCTIONS, ACTIVITIES OR PROCEDURESRADIOLOGY DEPARTMENT

The Radiology Department consists of a radiologist, technologists, clerical staff and file room staff. Listed below are areas of concern one must consider when establishing staffing guidelines.

A list of procedures will be given from which the time standards will be made to develop the actual guidelines.

Technologists:

1. Number of x-ray examinations accomplished.
2. Types of examinations accomplished.
3. Conditions of the patient being examined.
4. Stage of the training of resident physician doing the examination.
5. Availability of a radiologist for a specific specialty.
6. The availability of transportation.
7. Number of bedside examinations and operating room procedures.
8. Amount of accrued leave which must be covered.

Clerical Staff:

1. Number of examination reports to be typed.
2. Number of interruptions; i.e., telephone calls, visitors, etc.

3. The length of the reports.
4. Number of lines typed.
5. Number of transcripts requested.
6. Amount of correspondence generated by physician staff to include teaching, professional societies and other University related business.
7. Amount of accrued leave which must be covered.

File Room:

1. Number of patients examined.
2. Number of clinics requesting films.
3. Number of films requested by each clinic.
4. Number of films being transferred in and out.
5. Number of physicians requesting individual folders.
6. Number of requests for examination results.
7. Available space, particularly concerned with how tightly x-ray jackets are jammed into shelving.
8. Distance of various file rooms from Radiology Service.



The following procedures are performed by the Radiology Department:

|                           |                            |
|---------------------------|----------------------------|
| Abdomen                   | Both Hips                  |
| Abdomen Series            | Hip Nail in Operating Room |
| GB, GI                    |                            |
| Esophagus                 | Femur                      |
| GI                        | Knee                       |
| GI with Esophagus         | Both Knees                 |
| GI with Small Bowel       | Tibia                      |
| Small Bowel Series        | Ankle                      |
| Barium Enema              | Both Ankles                |
| Barium Enema with Air     | Foot                       |
| Gallbladder               | Os Calcis                  |
| Operative Cholangiogram   | Toes                       |
| T-Tube Cholangiogram      | Post Reduction             |
| Intravenous Cholangiogram | 1. E.R.                    |
|                           | 2. O.R.                    |
| Clavicle                  | P.E.G.                     |
| Shoulder                  | Ventriculogram             |
| Scapula                   | Eye for Foreign Body       |
| Acromioclavicular Joints  | Eye, Foreign Body          |
| Humerus                   | Localization               |
| Elbow                     | Mandible                   |
| Forearm                   | Mastoids                   |
| Wrist                     | Facial Bones or Orbits     |
| Hand                      | Nasal Bones                |
| Both Hands                | Optic Foramen or Sella     |
| Fingers                   | Turcica                    |
| Hip                       | Sinuses                    |

## Procedures performed by Radiology Department (cont'd)

Skull

TMJ's

Neck for Soft Tissue

Sialogram

Palate Study

Chest

Cardiac Series (4 views of chest)

Chest or Cardiac Fluoro

Bronchogram, Unilateral

Bronchogram, Bilateral

Ribs, Unilateral

Ribs, Bilateral

Sternum or Sternoclavicular Joints

POSITION OR STAFF TITLESRADIOLOGY DEPARTMENT

Director of Radiology

Radiologist

Chief, Nuclear Medicine

Chief, Radiologic Technician

Radiologic Technician

Darkroom Attendant

Nuclear Laboratory Technician Supervisor

Nuclear Medical Technologist

Scheduling Clerk

## SOCIAL SERVICE DEPARTMENT

The purpose of the Social Service Department is to assist in meeting the problems of patients whose physical needs may be aggravated by social factors and who, therefore, may require social treatment based on their medical conditions and courses of treatment.

The responsibility of this department includes contribution to diagnosis and treatment through an understanding of the social elements of patients' lives in relation to disability, illness, or other problems. By obtaining information about the patients as total individuals in the social and economic environment in which they live and work; their capacity to understand and participate in a plan of medical or psychiatric treatment; their obligations; and their material and personal resources, the department aids the hospital staff in understanding and treating illnesses more effectively. Similarly, by interpreting the plan of treatment to the patients and assisting in their personal affairs so as to bring relief from worry, the Social Service Department contributes to treatment and rehabilitation of the whole person. The department may be responsible for followup visits to homes of discharged patients

and outpatients, in order to insure continuation of treatment in an atmosphere conducive to preservation of health.

In accomplishing its responsibilities, such functions are performed as the practice of case work and group work; development of social service program within the hospital; and participation in development of social and health programs in the community, in educational programs for professional personnel, and in medical social research. Records to be incorporated with patients' charts must be kept on the social work with patients, and for educational and research purposes. Social workers are assigned to duty in various clinics and in patient services of the hospital, where they assist patients referred to them by the medical staff or other persons and agencies.

FUNCTIONS, ACTIVITIES OR PROCEDURES

SOCIAL WORK DEPARTMENT

Number of hospital admissions

Number of outpatient visits

Number of social work cases

Type of case:

Child abuse

Drug abuse

Alcohol abuse

Other

Complexity of case - does it require one social worker, two social workers, one social worker and one social work aide, etc.?

POSITION OR STAFF TITLESSOCIAL SERVICE DEPARTMENT

Director, Social Service

Social Worker - Medical

Social Worker - Psychiatric

Social Worker Aide

CHAPTER IV

Review, State-of-the-Art,  
Conclusions, Recommendations



The objective of this thesis as outlined in the foregoing chapters was to present various concepts and the necessary knowledge involved in manpower planning, health manpower planning, and the development of manpower and staffing guidelines in hospitals. To establish accurate staffing guidelines, one must have a thorough knowledge of both manpower planning and health manpower planning. Once this knowledge is obtained, different formulas and criteria may be developed to establish these guidelines. The purpose of this chapter is to review those ingredients involved in manpower planning, health manpower planning, and developing staffing guidelines in major hospital departments. The following pages will present a review of this thesis, the State-of-the-Art, Conclusions, and Suggestions for future research.

#### MANPOWER PLANNING

There are many concepts and definitions attached to manpower planning. Chapter One indicated it is difficult to draw up a precise definition of this type of planning. Manpower planning is a precise art of which no particular discipline can claim a monopoly on its interest. This involves having the right kind of labor and adjusting manpower requirements to meet available supplies and demands. Manpower planning denotes many dimensions of human resource development both as a term of art and as an area of public policy. As stated earlier, there is no single universally accepted

method for projecting manpower supplies and requirements. The best approach is often derived from a borrowing of several techniques and incorporating these into one's own method of manpower forecasting or planning.

Manpower planning is based on systematic attempts to anticipate requirements for personnel with particular skills, qualifications and aptitudes. The forecast of these requirements is generally the first step in the manpower planning process. It is a major conclusion that the shorter the forecasting period, the more accurate the forecast will be. This accuracy diminishes as the length (years) of this forecasting period increases. To some extent manpower planning is a judgmental process. Forecasting decisions must be based on both present conditions, as well as conditions in the future.

In the private sector the demand for labor is a derived demand. That is, this demand is the result of the demand for goods and services produced by labor. Unlike the private sector, manpower planners in the public sector are not concerned entirely with the derived demand for labor. They have the added responsibility of identifying groups which are unable to obtain stable employment and providing manpower programs for them. Some of the specific areas of concern for government manpower planners are identifying the need for manpower services, forecasting future labor market

conditions, locations of existing labor markets, and providing various forms of skill development opportunities to facilitate placement functions in the future.

Presented earlier in this thesis were various techniques or methods of forecasting used in manpower planning. This included econometric methods, productivity methods, survey methods and trend projection methods. The following is a review of these methods or techniques used in manpower planning. The strength and weakness of each method will also be reviewed.

Econometric method: This method of manpower forecasting is a technique for deriving occupational labor requirements from estimated levels for final demand for goods and services in the economy in some future year. Econometric methods have the advantage of producing refined forecasts of manpower requirements by individual occupations. It does this within the framework and relationships of the entire economy. A major weakness of the econometric method is an insufficiency of truthful data and information. Because this method requires several experts and analysts, it is both costly and time consuming.

Productivity method: This method forecasts employment for various target years by sector and occupation. Productivity methods have the advantage of coordinating manpower forecasts with the overall economic development plan. The weaknesses associated with this method are the difficulties in determining

target year output and deriving occupational requirements from aggregate sectoral requirements.

Survey method: This method makes practical use of manpower requirements for employers for forecasting manpower demand at a given target year. The main advantage to this method is that surveys and interviews can be made at established or frequent intervals. This means manpower requirements and demands can be kept moderately up to date. The main problem associated with this method is that firms included in the sample may not respond to the survey.

Trend-projection method: This method is used to project past trends of aggregate and occupational labor forces through to the target years. The major strength of this method is that the results require a considerable amount of data going back a fair number of years.

#### HEALTH MANPOWER PLANNING

The concept of health manpower includes those already working in the field of health services. Potential health workers are those who have the ability to engage in a health occupation but at present are not doing so, and prospective manpower which includes those who are presently undergoing education and training that will permit them to join the health services sector. As indicated in Chapter Two, health manpower planning is the process of estimating the quantity and type of knowledge, skills, and ability needed to

introduce predetermined alterations in the functioning of a health system so as to make it more probable that the desired changes in the health of a population will be achieved. Health manpower planning should be integrated into broad social-economic planning for a nation as a whole. The same holds true in health manpower planning as was found in manpower planning; that is, there is no single universally accepted method for projecting health manpower supplies and requirements. There are no precise criteria for determining what health manpower planning should encompass and what problems it should try to solve.

One of the difficulties in health manpower planning is the long lead time required to bring about changes through some education and training programs. It was indicated earlier that for a profession such as medicine, a ten-year planning period is insufficient. Decisions made in year one will affect the supply throughout the remaining years of one's education. Through optimum utilization of current and future supplies of health manpower, we can provide the most economical mix of professional and auxiliary health workers. Thus, this difficulty may be overcome.

Chapter Two of this thesis presented characteristics of the demand for health manpower. Two types of these demands are: (1) demands placed directly on private practitioners, and (2) those demands placed on health care institutions. The demand for health

manpower services requires an understanding of the factors which influence the consumer's health, his behavior, and his consumption of health manpower services. Basically, this involves cultural demographic factors, economic factors, and health care delivery constraints.

Cultural and demographic factors: This includes one's age, sex, marital status, family size, education, and residence. Information obtained through cultural and demographic factors are used as a basis for determining health services utilization patterns.

Economic factors: The price of health services and the ability of the consumer to pay for services are factors which affect the demand for health manpower. Another factor which must be considered when analyzing the economics of health care utilization is health insurance. This insurance influences both the quantity and type of medical care demanded.

Health care delivery constraints: Long travel, waiting times, accessibility, etc. are all factors which influence an individual's decision to seek health care. Alternative modes of health care delivery, such as prepaid versus fee-for-service or group practice versus solo practice, further affect the manner in which these services are utilized. This in turn has a tremendous influence on health manpower requirements.

Health manpower planners must insure the proper manning of the health care delivery system. They must see that the right number and types of health manpower

are available when and where they are needed. To accomplish this, health manpower planners must gather two kinds of information. The first concerns itself with the existing stock of manpower in terms of both their number and type. The second type of information relates to both present and projected requirements for health manpower. Alternative methods for estimating requirements are used by health manpower planners. Methodological approaches previously discussed in this thesis include the manpower population ratio approach, the service targets approach, the health need approach, the economic demand approach, the functional analysis approach, and the use of models approach. Following is a brief review of these methods and their various strength and weaknesses:

Manpower population ratio approach: This is the most widely used approach for determining health manpower requirements. This method involves the identification of a suitable health manpower population ratio for a future point in time, and then the application of this ratio to the projected population to derive manpower requirements. The simplicity of this method is its greatest advantage. Data requirements are usually modest and not very sensitive to errors. Disadvantages of this approach relate to the selection of unrealistic ratios resulting in major errors in economic and manpower policies. Another disadvantage of this approach is that with primary emphasis on man-

power, little attention may be given to the kind, quality, volume and frequency of services.

Service targets approach: This approach addresses the question as to how many services of each kind should be produced to meet expected requirements for health care, and what manpower will be required to provide these services or targets. The major advantage of this approach is its primary impetus on services rather than manpower. Attention is directed towards productivity, interpersonal ratios, and efficient resource utilization. The major drawback to this method is that it is prone to having standards based more on desires than on reality, leading to major planning errors.

Health needs approach: This approach seeks to determine what kinds, amounts, and quality levels of services are required to maintain a healthy population. These services are then converted into manpower requirements. The greatest strength of this approach is that it permits allocation of resources where they will have the greatest affect on health. Another advantage of this approach is that it provides services according to need and not to social or economic conditions of consumers. The main drawback of this approach is that it can be complicated, costly, and requires sophisticated data. This approach may also result in costly projections of service requirements far in excess of ability to provide them.



Econometric demand approach: This approach considers what health services are individuals and/or the government willing and able to pay for. Advantages associated with this approach are that it helps describe the dynamics and determinants of health services utilization. Another advantage is that it tends to produce economically realistic projections. Major disadvantages related to this approach are that it does not necessarily take into account the quality of services or their relevance to the health problems of the country. This approach may further neglect consideration of ways to improve manpower productivity.

Functional analysis approach: This type of approach is concerned with ways in which the qualifications of personnel can be systematically matched to the requirements of job performance. The main advantage of this approach is that it produces written requirements for job performance. Weaknesses associated with this approach is its indecisiveness on what norms to use in evaluating and establishing qualifications and requirements of job performance.

Use of models approach: The purpose of this approach is to allow use of a model as a low cost and readily modifiable substitute for actual health manpower planning situations. Advantages to this approach are its ease in manipulating models to meeting real or actual situations. The major weakness of this approach is that the model will be no more accurate

than the data used in forming the model.

#### HOSPITAL MANPOWER PLANNING

As indicated earlier, sophisticated equipment, hospital accreditation, and patients themselves have all affected manpower planning and the development of manpower and staffing guidelines in hospitals. With the rapid changes involved in both new hospitals and expanding hospitals, manpower planning in hospitals is now more than ever a vital issue. Hospital departments are becoming more complex, more productive, and provide more services. This alone demonstrates the need for accurate development of manpower and staffing guidelines in health institutions.

Over the past number of years there has been a considerable increase in the utilization of hospital services. One of the most difficult questions the manpower planner must consider is the rate of this increasing utilization. The planner must consider how fast will the number of patients increase to fill hospital beds? Will the increase slow, or will it set a rapid pace? The purpose of Chapter Three was to take a close look at these concerns and various other areas which one must be aware of in the development of manpower and staffing guidelines in hospitals. The main criteria in developing these guidelines is to develop labor performance standards. As previously outlined, this is accomplished by listing all procedures, examinations, functions, etc. performed in each

department. This list should include not only current activities, but any future plans that may increase or decrease functions of each department. A standard completion time for each function is determined. Adjustments to completion times may be set by developing an aggregate standard. This aggregate then becomes the standard time allowed to complete the function or activity. Time standards for the majority of activities, functions or procedures can be developed through direct observation. Appropriate allowances will probably be necessary in certain circumstances. Once the activity frequencies have been determined, they are multiplied by the corresponding time standards to determine the workload by day and shift. This is then converted into the actual manpower and staffing guidelines.

Chapter Three also presented a discussion on each of the following departments which included a list of functions, procedures, etc. that one must pay attention to when establishing manpower and staffing guidelines. A list of possible staff or position titles was also given in relation to these departments.

|                 |                 |
|-----------------|-----------------|
| Admitting       | Medical Records |
| Business Office | Nursing         |
| Dietary         | Radiology       |
| Housekeeping    | Social Work     |

STATE-OF-THE-ART, CONCLUSIONS,  
RECOMMENDATIONS

Developing standards for use in determining and assessing health manpower needs in a local area for the nation as a whole is an important but very difficult undertaking. One of the major problems is selection of an acceptable and appropriate methodology for judging the numerical adequacy of the existing supply of manpower. No single method of determining standards has proven entirely satisfactory or universally applicable, and there is little consensus on what standards should attempt to measure, nor how the measurement should be made.<sup>1</sup> There are many different approaches to and methods for estimating and forecasting health manpower requirements, ranging from the very simple physician-population approach to the extremely complex and technical equilibrating and optimizing model approaches. Each of these approaches has real advantages; each of them also has potential problems and disadvantages.<sup>2</sup> One of the major roadblocks in estimation of manpower requirements is the problem of data. Needed data are often simply not available.

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<sup>1</sup>Applied Management Sciences, Inc., Silver Springs, Maryland. Review of Health Manpower Population Requirements Standards. U.S. Dept. of H.E.W., Pub.No. (HRA) 77-22, October 1976.

<sup>2</sup>U.S. Dept. of H.E.W., Estimating Manpower Requirements, A Background Paper. U.S. Dept. of H.E.W., Report No. 76-114, March 1977.

Data that are available may have inconsistencies in definition, differences in coverage, or inconsistent timing in collection. The state-of-the-art often does not permit proper utilization of existing data, so data may have to be tailored to the existing methodology by which the estimates are to be made. In addition, it may not be clear as to how existing data can be utilized, and how various parameters are to be accounted for by inadequate data.<sup>3</sup>

Currently, both manpower and health manpower planning are receiving widespread recognition. Both private and government interests are increasing to a large degree in both these areas. Because of this, the funding mechanism is much more easier for these two areas than in hospital manpower planning. Both manpower planning and health manpower planning are well beyond the infancy stage and are establishing an excellent track record for progress. Hospital manpower planning and the development of staffing guidelines in this type of health care facility has not been so fortunate. This type of planning in hospitals is still in the embryo stage and is just beginning to make its mark in the planning industry.

Numerous reports on both manpower and health manpower represent an increasing effort in several countries

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<sup>3</sup>U.S. Dept. of H.E.W., Estimating Manpower Requirements, A Background Paper. U.S. Dept. of H.E.W., Report No. 76-114, March 199.

to determine their health manpower needs. Major changes have occurred in the structure of medical education. Many of the earlier manpower studies considered only one type of health worker, this being the physician. More recent studies have considered social, psychological, and economic attributes of the population. These more recent studies have carried into considerations for both students enrolled in health manpower fields, teachers involved in the educating process of these various health professions, and those practitioners who are currently employed in a health manpower position. Once again, the focus here has been on either manpower or health manpower planning.

One of the major conclusions of this thesis is that although the development of manpower and staffing guidelines in hospitals is still relatively young, it holds an important future. For this area to receive the amount of attention that is required, we will need resources from many disciplines. Although there are individuals across both Canada and the United States who can be considered an expert in the area of developing staffing guidelines, we will need more qualified people. Various health and hospital associations in these two countries are heading in this direction. They are collecting data related to those hospital departments discussed earlier in this thesis. From this data these associations are beginning to develop staffing guidelines.

The planning, research, writing and review of this thesis has brought about the following recommendations:

1. A collection of staffing guidelines on those departments outlined in this thesis be made. This can be accomplished through inquiring to each hospital or health association across Canada and the United States. The key to this recommendation is financial support for this type of project. Since the development of manpower and staffing guidelines in hospitals is still very young, the work that is involved in these reports is extremely large, and thus, the price of these reports is extremely high. The author of this thesis developed a letter and sent it to over sixty health and hospital associations in both Canada and the United States. The response from this letter was not that which was expected. Two major problems were encountered. One, a majority of those associations responded in saying that the reports that were written by members of their staff were not available to non-members of their association. The second problem encountered was that those associations who were willing to release such reports were asking a high dollar amount for individual reports. It was calculated if all the reports that were asked for could be received, the dollar amount would range between \$2,000. and \$2,500.

2. Although the cost is extremely high for this

type of research, it is recommended that the knowledge and work produced in writing this thesis be used as a stepping stone to ones advantage in receiving a research grant or stipend to be used towards the development of manpower and staffing guidelines in hospitals. The author gives full permission for the knowledge given in this thesis to be used for such a purpose.

3. Providing the above is accomplished, it is recommended that if manpower and staffing guidelines are developed for those departments outlined in this thesis, that this volume of work be compiled and a model or representative staffing guideline be established for all hospitals. The work may then carry further into all other hospital departments.



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## Appendix A

### LIST OF HEALTH OCCUPATIONS

The occupations designated as "health occupations" and included in this list are restricted to those for which special education or training, designed to prepare the worker to function in a health setting, is usually required. There are some exceptions to this rule, notably in the areas of natural and social sciences, in order to include within disciplines that are not closely related to health the particular sub-specialties which are intimately concerned with health subject-matter. As a result of including these sub-specialties (such as estuarine oceanographer, limnologist, physical anthropologist), the list represents occupations that the health administrator must be concerned with when assembling staff to attack health problems. It is more inclusive than a list of occupations for which health authorities must assume responsibility for education.

About 125 occupations are identified by primary title. Also shown are approximately 250 alternate titles; these are synonyms, or designations related to form of practice, place of practice, or specialty.

An attempt has been made to standardize terminology in relation to level of training. Unless there is strong contrary convention, our usage is:

|                |   |   |
|----------------|---|---|
| "Technologist" | } | educational preparation at the baccalaureate level or above   |
| "Therapist"    |   |   |
| "Technician"   | } | educational preparation at the associate degree level (2 years of college education or other formal preparation beyond high school) |
| "Assistant"    |   |   |
| "Aide" - - -   |   | specialized training of less than 2 years duration beyond high school, or on-the-job training.                                      |

It is hoped that the primary occupational titles used here will have some influence on nomenclature in educational and training programs and also help the reader understand the relationship of occupations within the various health fields. Of course, job titles used in the health services industry do not conform to this or any other scheme or system. Titles indicating distinct levels of training or responsibility within a field are shown whenever it is known that planning or actual development of such a hierarchy is underway.

Although approximately 375 titles are listed, the inventory omits some workers within the health services industry. There are many business, clerical, and maintenance occupations that are essential but not unique to the industry, so that no special education or formal training for the health field is required.

Among such occupations are accountants, admitting officers, business managers, cashiers, controllers, credit managers, directors of office services, employment interviewers, employment managers, housekeepers and housekeeping workers, job analysts, laundry managers and workers, maintenance workers, personnel directors and office workers, public relations directors, purchasing agents, stationary engineers, and stockroom managers.

The titles were compiled by the Division of Allied Health Manpower, Bureau of Health Professions Education and Manpower Training. An earlier version of this list appears as an appendix to HEALTH RESOURCES STATISTICS, 1968 (PHS Pub. No. 1509, 1968 edition).

The estimated number of persons employed in each health occupation in 1967 is shown in appendix table A-1. Where there are no data, the symbol - - - appears. The total of 3,515,000 workers, while obviously an understatement, is the best figure available for tabular presentation in this publication.

## LIST OF HEALTH OCCUPATIONS

| <i>Primary title <sup>1</sup></i>       | <i>Alternate title</i>  |
|---|---|
| <b>1. ADMINISTRATION</b>                |   |
| Health administrator .....              | Health officer or commissioner<br>Environmental control administrator<br>Health agency executive director<br>Health care administrator<br>Hospital administrator<br>Medical care administrator<br>Nursing home administrator<br>Public health administrator |
| Health program analyst .....            | Public health analyst<br>Public health specialist   |
| Health program representative .....     | Public health advisor<br>Public health representative   |
| Health systems analyst                  |   |
| <b>2. BIOMEDICAL ENGINEERING</b>        |   |
| Biomedical engineer .....               | Bioengineer<br>Medical engineer   |
| Biomedical engineering technician ..... | Medical engineering technician  |
| Biomedical engineering aide             |   |
| <b>3. CHIROPRACTIC AND NATUROPATHY</b>  |   |
| Chiropractor .....                      | Doctor of Chiropractic  |
| Naturopath .....                        | Naturopathic physician  |

## Appendix A

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|                |   |   |
|----------------|---|---|
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| "Therapist"    |   |   |
| "Technician"   | } | educational preparation at the associate degree level (2 years of college education or other formal preparation beyond high school) |
| "Assistant"    |   |   |
| "Aide" - - -   |   | specialized training of less than 2 years duration beyond high school, or on-the-job training.                                      |

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## LIST OF HEALTH OCCUPATIONS

### *Primary title*<sup>1</sup>

### *Alternate title*

#### 1. ADMINISTRATION

|   |   |
|---|---|
| Health administrator . . . . .          | Health officer or commissioner<br>Environmental control administrator<br>Health agency executive director<br>Health care administrator<br>Hospital administrator<br>Medical care administrator<br>Nursing home administrator<br>Public health administrator |
| Health program analyst . . . . .        | Public health analyst<br>Public health specialist   |
| Health program representative . . . . . | Public health advisor<br>Public health representative   |
| Health systems analyst                  |   |

#### 2. BIOMEDICAL ENGINEERING

|   |                                 |
|---|---------------------------------|
| Biomedical engineer . . . . .               | Bioengineer<br>Medical engineer |
| Biomedical engineering technician . . . . . | Medical engineering technician  |
| Biomedical engineering aide                 |                                 |

#### 3. CHIROPRACTIC AND NATUROPATHY

|                        |                        |
|------------------------|------------------------|
| Chiropractor . . . . . | Doctor of Chiropractic |
| Naturopath . . . . .   | Naturopathic physician |

| <i>Primary title</i> <sup>1</sup>  | <i>Alternate title</i>  |
|--|---|
| <b>4. CLINICAL LABORATORY SERVICES</b> <sup>2</sup>                            |   |
| Clinical laboratory scientist <sup>3</sup> . . . . .                           | Clinical chemist <sup>3</sup><br>Microbiologist <sup>3</sup>  |
| Clinical laboratory technologist . . . . .                                     | Medical laboratory technologist<br>Medical technologist<br>Blood banking technologist<br>Chemistry technologist<br>Hematology technologist<br>Microbiology technologist   |
| Clinical laboratory technician . . . . .                                       | Medical laboratory technician<br>Medical technician<br>Cytotechnician<br>Cytotechnologist   |
| Clinical laboratory aide . . . . .   | Laboratory assistant<br>Certified laboratory assistant<br>Histologic aide<br>Histologic technician<br>Pathology laboratory aide   |
| <b>5. DENTISTRY AND ALLIED SERVICES</b>  |   |
| Dentist . . . . .  | Endodontist<br>Oral pathologist<br>Oral surgeon<br>Orthodontist<br>Pedodontist<br>Periodontist<br>Prosthodontist<br>Public health dentist   |
| Dental hygienist<br>Dental assistant<br>Dental laboratory technician . . . . . | Dental laboratory assistant   |
| <b>6. DIETETIC AND NUTRITIONAL SERVICES</b>                                    |   |
| Dietitian . . . . .  | Administrative dietitian<br>Consultant (public health) dietitian<br>Research dietitian<br>Teaching dietitian<br>Therapeutic dietitian   |
| Nutritionist <sup>3</sup> . . . . .  | Public health nutritionist  |
| Dietary technician . . . . .   | Dietary (food service) assistant<br>Food service manager<br>Food service technician   |
| Dietary aide . . . . .   | Dietary (food service )worker   |
| Food service supervisor . . . . .  |   |
| <b>7. ENVIRONMENTAL HEALTH SERVICES</b> <sup>4</sup>                           |   |
| Environmental scientist <sup>3</sup> . . . . .                                 | Sanitary sciences specialist <sup>3</sup><br>Air pollution meteorologist <sup>3</sup><br>Environmental control chemist <sup>3</sup><br>Estuarine oceanographer <sup>3</sup><br>Ground water hydrologist <sup>3</sup><br>Health physicist <sup>3</sup><br>Limnologist <sup>3</sup> |

| <i>Primary title</i> <sup>1</sup>             | <i>Alternate title</i>  |
|---|---|
| <b>7. ENVIRONMENTAL HEALTH SERVICES—Cont.</b> |   |
| Environmental engineer.....                   | Sanitary engineer<br>Air pollution engineer<br>Hospital engineer<br>Industrial hygiene engineer<br>Public health engineer<br>Radiological health engineer |
| Environmental technologist.....               | Sanitarian<br>Air pollution specialist<br>Industrial hygienist<br>Radiological health specialist  |
| Environmental technician.....                 | Sanitarian technician<br>Environmental engineering technician<br>Radiological health technician (monitor)   |
| Environmental aide.....                       | Sanitarian aide<br>Environmental engineering aide<br>Sewage plant assistant<br>Waterworks assistant   |
| <b>8. FOOD AND DRUG PROTECTIVE SERVICES</b>   |   |
| Food technologist                             |   |
| Food and drug inspector                       |   |
| Food and drug analyst                         |   |
| <b>9. HEALTH EDUCATION</b>                    |   |
| Health educator.....                          | Community health educator<br>Public health educator<br>School health coordinator<br>School health educator  |
| Health education aide                         |   |
| <b>10. INFORMATION AND COMMUNICATION</b>      |   |
| Health information specialist.....            | Biomedical communication specialist   |
| Health science writer.....                    | Medical writer  |
| Health technical writer.....                  | Medical technical writer<br>Medical editor  |
| Medical illustrator.....                      | Medical photographer  |
| <b>11. LIBRARY SERVICES</b>                   |   |
| Medical librarian                             |   |
| Medical library assistant                     |   |
| Hospital librarian.....                       | Patients' librarian   |
| <b>12. MATHEMATICAL SCIENCES</b> <sup>4</sup> |   |
| Mathematician.....                            | Biomathematician<br>Demographer   |
| Statistician.....                             | Biostatistician<br>Health statistician<br>Vital record registrar  |

| <i>Primary title</i> <sup>1</sup>  | <i>Alternate title</i>  |
|------------------------------------|---|
| <b>13. MEDICAL RECORD SERVICES</b> |   |
| Medical record librarian.....      | Medical record specialist                                     |
| Medical record technician.....     | Medical record technologist                                   |
| Medical record clerk.....          | Medical record assistant                                      |
|                                    | Medical record aide   |
| <b>14. MEDICINE AND OSTEOPATHY</b> |   |
| Physician.....                     | Doctor of Medicine—M.D.                                       |
| Osteopathic physician.....         | Doctor of Osteopathy—D.O.                                     |
|                                    | Allergist   |
|                                    | Anesthesiologist  |
|                                    | Aviation medicine specialist                                  |
|                                    | Cardiovascular disease specialist                             |
|                                    | Colon and rectal surgeon (proctologist)                       |
|                                    | Dermatologist   |
|                                    | Forensic pathologist  |
|                                    | Gastroenterologist  |
|                                    | General practitioner  |
|                                    | Gynecologist  |
|                                    | Internist   |
|                                    | Manipulative therapy specialist                               |
|                                    | Neurological surgeon  |
|                                    | Neurologist   |
|                                    | Occupational medicine specialist                              |
| M.D.                               | Obstetrician  |
| or                                 | Ophthalmologist   |
| D.O.                               | Orthopedic surgeon  |
|                                    | Otolaryngologist (otorhinolaryngologist)                      |
|                                    | Pathologist   |
|                                    | Pediatrician <sup>5</sup>                                     |
|                                    | Physiatrist (physical medicine and rehabilitation specialist) |
|                                    | Plastic surgeon   |
|                                    | Preventive medicine specialist                                |
|                                    | Psychiatrist <sup>6</sup>                                     |
|                                    | Public health physician                                       |
|                                    | Pulmonary disease specialist                                  |
|                                    | Radiologist <sup>7</sup>                                      |
|                                    | Surgeon   |
|                                    | Thoracic surgeon  |
|                                    | Urologist   |
|                                    | Intern  |
|                                    | Resident  |
|                                    | Fellow  |
| <b>15. MIDWIFERY</b>               |   |
| Midwife.....                       | Lay midwife   |
|                                    | Nurse midwife <sup>8</sup>                                    |



| <i>Primary title</i> <sup>1</sup>          | <i>Alternate title</i>   |
|--|--|
| <b>16. NATURAL SCIENCES</b> <sup>4</sup>   |  |
| Anatomist.....                             | Cytologist<br>Embryologist<br>Histologist  |
| Botanist                                   |  |
| Chemist.....                               | Bioanalyst<br>Biochemist<br>Clinical chemist <sup>9</sup><br>Environmental control chemist <sup>10</sup>   |
| Ecologist                                  |  |
| Entomologist                               |  |
| Epidemiologist                             |  |
| Geneticist                                 |  |
| Hydrologist.....                           | Ground water hydrologist <sup>10</sup>   |
| Immunologist                               |  |
| Meteorologist.....                         | Air pollution meteorologist <sup>10</sup>  |
| Microbiologist <sup>9</sup> .....          | Bacteriologist<br>Mycologist<br>Parasitologist<br>Virologist   |
| Nutritionist <sup>11</sup>                 |  |
| Oceanographer.....                         | Estuarine oceanographer <sup>10</sup>  |
| Pathologist                                |  |
| Pharmacologist.....                        | Toxicologist   |
| Physicist.....                             | Biophysicist<br>Health physicist <sup>10</sup>   |
| Physiologist                               |  |
| Sanitary sciences specialist <sup>10</sup> |  |
| Zoologist.....                             | Limnologist <sup>10</sup>  |
| <b>17. NURSING AND RELATED SERVICES</b>    |  |
| Nurse.....                                 | Registered nurse—R.N.<br>Graduate nurse<br>Professional nurse<br><br>Hospital nurse<br>Occupational health (industrial) nurse<br>Office nurse<br>Private duty nurse<br>Public health nurse<br>School nurse<br><br>Nurse anesthetist<br>Nurse midwife <sup>12</sup><br>Obstetrical nurse<br>Pediatric nurse<br>Psychiatric nurse<br>Surgical (operating room) nurse |
| Practical nurse.....                       | Licensed practical nurse<br>Vocational nurse<br>Licensed vocational nurse  |
| Nursing aide.....                          | Nursing assistant<br>Psychiatric (mental health) aide<br>Home aide—homemaker<br>Visiting health aide<br>Floor clerk  |
| Orderly.....                               |  |
| Attendant.....                             |  |
| Home health aide.....                      |  |
| Ward clerk.....                            |  |

| <i>Primary title <sup>1</sup></i>                       | <i>Alternate title</i>  |
|---|---|
| <b>18. OCCUPATIONAL THERAPY</b>                         |   |
| Occupational therapist                                  |   |
| Occupational therapy assistant.....                     | Occupational therapy technician   |
| Occupational therapy aide                               |   |
| <b>19. ORTHOTIC AND PROSTHETIC TECHNOLOGY</b>           |   |
| Orthotist.....  | Orthopedic brace maker  |
| Orthotic aide   |   |
| Prosthetist.....  | Artificial limb maker   |
| Prosthetic aide   |   |
| Restoration technician                                  |   |
| <b>20. PHARMACY</b>                                     |   |
| Pharmacist.....   | Community pharmacist<br>Hospital pharmacist<br>Industrial pharmacist  |
| Pharmacy aide.....                                      | Pharmacy helper   |
| <b>21. PHYSICAL THERAPY</b>                             |   |
| Physical therapist                                      |   |
| Physical therapy assistant.....                         | Physical therapy technician   |
| Physical therapy aide                                   |   |
| <b>22. PODIATRY</b>                                     |   |
| Podiatrist.....   | Chiropodist<br>Foot orthopedist<br>Foot roentgenologist<br>Podiatric surgeon<br>Pododermatologist                   |
| <b>23. RADIOLOGIC TECHNOLOGY</b>                        |   |
| Radiologic technologist                                 |   |
| Radiologic technician.....                              | X-ray technician<br>Radiation therapy technician  |
| <b>24. SECRETARIAL AND OFFICE SERVICES <sup>4</sup></b> |   |
| Secretary.....  | Dental secretary<br>Medical secretary   |
| Office assistant.....                                   | Dentist's office assistant<br>Medical assistant<br>Optometrist's office assistant<br>Physician's office assistant   |
| <b>25. SOCIAL SCIENCES <sup>4</sup></b>                 |   |
| Anthropologist.....                                     | Cultural (social) anthropologist<br>Physical anthropologist   |
| Economist.....  | Health economist  |
| Psychologist.....                                       | Clinical psychologist<br>Counseling psychologist<br>Measurement psychologist (psychometrist)<br>Social psychologist |
| Sociologist.....  | Medical sociologist   |

*Primary title*<sup>1</sup>*Alternate title*

## 26. SOCIAL WORK

|                                |                           |
|--------------------------------|---------------------------|
| Clinical social worker.....    | Medical social worker     |
| Clinical social work assistant | Psychiatric social worker |
| Clinical social work aide..... | Clinical casework aide    |

## 27. SPECIALIZED REHABILITATION SERVICES

|                                      |                                   |
|--------------------------------------|-----------------------------------|
| Corrective therapist                 |                                   |
| Corrective therapy aide              |                                   |
| Educational therapist                |                                   |
| Manual arts therapist                |                                   |
| Music therapist                      |                                   |
| Recreation therapist.....            | Therapeutic recreation specialist |
| Recreation therapy aide              |                                   |
| Homemaking rehabilitation consultant |                                   |

## 28. SPEECH PATHOLOGY AND AUDIOLOGY

|                         |                   |
|-------------------------|-------------------|
| Audiologist.....        | Hearing therapist |
| Speech pathologist..... | Speech therapist  |

## 29. VETERINARY MEDICINE

|                            |   |
|----------------------------|---|
| Veterinarian.....          | Laboratory (animal medicine) veterinarian |
|                            | Public health veterinarian                |
|                            | Veterinary laboratory diagnostician       |
|                            | Veterinary microbiologist                 |
|                            | Veterinary pathologist                    |
|                            | Veterinary radiologist                    |
|                            | Veterinary surgeon                        |
|                            | Veterinary toxicologist                   |
| Veterinary technician..... | Animal technician                         |

## 30. VISION CARE

|                               |                                       |
|-------------------------------|---------------------------------------|
| Ophthalmologist <sup>13</sup> |                                       |
| Optometrist                   |                                       |
| Vision care technologist..... | Ocular care technologist              |
|                               | Ophthalmic technologist               |
|                               | Optometric technologist               |
| Technician—                   |                                       |
| Vision care technician.....   | Ocular care technician                |
|                               | Ophthalmic technician (assistant)     |
|                               | Optometric technician (assistant)     |
| Orthoptic technician.....     | Orthoptist                            |
| Optician.....                 | Dispensing optician                   |
|                               | Ophthalmic dispenser (optical fitter) |
|                               | Contact lens technician               |
|                               | Lens grinder-polisher <sup>14</sup>   |
|                               | Optical (laboratory) mechanic         |
| Visual care aide.....         | Ocular care aide                      |
|                               | Ophthalmic aide                       |
|                               | Optometric aide                       |
|                               | Visual training aide                  |

| <i>Primary title</i> <sup>1</sup>               | <i>Alternate title</i>  |
|---|---|
| <b>31. VOCATIONAL REHABILITATION COUNSELING</b> |   |
| Vocational rehabilitation counselor.....        | Rehabilitation counselor  |
| <b>32. MISCELLANEOUS HEALTH SERVICES</b>        |   |
| Assistance for physicians—                      |   |
| Physician's associate <sup>15</sup> .....       | Child health associate<br>Pediatric associate                           |
| Physician's assistant.....                      | Anesthetic assistant<br>Orthopedic assistant                            |
| Physician's aide.....                           | Obstetrical aide<br>Pediatric aide<br>Surgical aide                     |
| Emergency health service—                       |   |
| Medical emergency technician                    |   |
| Ambulance attendant (aide)                      |   |
| Inhalation therapy—                             |   |
| Inhalation therapist.....                       | Inhalation therapy technician   |
| Inhalation therapy aide                         |   |
| Medical machine technology—                     |   |
| Cardiopulmonary technician                      |   |
| Electrocardiograph technician                   |   |
| Electroencephalograph technician                |   |
| Other.....                                      | Biomedical instrument technician  |
| Nuclear medicine—                               |   |
| Nuclear medical technologist                    |   |
| Nuclear medical technician                      |   |
| Other health services—                          |   |
| Community health aide.....                      | Dental health aide<br>Mental health aide (worker)<br>School health aide |
| Extracorporeal circulation specialist           |   |
| Other   |   |

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### Footnotes

<sup>1</sup> The occupations listed are those which make a significant contribution to the health field and for which individuals have developed specialized competence.

<sup>2</sup> Includes pathology laboratory.

<sup>3</sup> See Natural Sciences.

<sup>4</sup> For some of the occupations listed, only a minority of the workers may be engaged in health related work.

<sup>5</sup> Includes specialists in pediatric allergy and cardiology.

<sup>6</sup> Includes specialists in child psychiatry.

<sup>7</sup> Includes specialists in diagnostic and therapeutic radiology.

<sup>8</sup> See Nursing and Related Services.

<sup>9</sup> See Clinical Laboratory Services.

<sup>10</sup> See Environmental Health Activities.

<sup>11</sup> See Dietetic and Nutritional Services.

<sup>12</sup> See Midwifery.

<sup>13</sup> See Medicine and Osteopathy.

<sup>14</sup> Also known as assembler, benchman, edger, or sur-facer; optical technician or shopman.

<sup>15</sup> Baccalaureate or higher educational background.