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**INTEGRATING WORKFORCE PLANNING,
HUMAN RESOURCES,
AND SERVICE PLANNING**

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Integrating workforce planning, Human resources, And service planning

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Abstract

This paper is one in 10 in a series of papers commissioned by the World Health Organization to take stock of the state of the science of human resources for health activities in the year 2000. This paper provides an analysis of how labour market indicators can be integrated into service planning, discusses whether planning is sufficiently responsive and flexible to retain relevance and validity in rapidly changing health systems, describes different models and approaches to linking and integrating workforce planning and service planning, discusses methodological approaches to integrating planning, and examines effective approaches to the use of computer-based scenario modeling to support assessment of current and future planning options. The context and broad crosscutting themes of public sector, political, social, and macro-economic changes have been considered. Where publications exist, empirical evidence serves as the basis for this analysis and country examples have been highlighted. While strides have been made in the practice of resource planning world-wide, health human resource planning in most countries has been poorly conceptualized, intermittent, varying in quality, profession-specific in nature, and without adequate vision or data upon which to base sound decisions.

Introduction

Changes in health systems worldwide have created new challenges for health human resource planning (HHRP). The World Health Organization (WHO) has been instrumental in modifying the principles of health human resource planning by emphasizing the integration and coordination of services and human resources, and the provision of education according to a Primary Health Care model (1). WHO (2) notes that provision of health care involves putting together a considerable number of resource inputs to deliver an extraordinary array of different service outputs. Health human resource planning should be broad in nature, incorporating the entire health workforce. Key stakeholders including health providers, planners and government policy makers must be involved in the entire planning process to facilitate acceptance of HHRP recommendations. Health system inputs must consider the appropriate balance between human and physical capital. Human capital decisions include the appropriate quantity, mix, and distribution of health services – finding this balance requires continuous monitoring, careful choices given the realities of countries in which choices are being made, and the use of research evidence to ensure that population health needs are addressed effectively and efficiently. Trends in societal factors such as determinants of health, needs of consumers, and the knowledge and skills of health providers need to be considered in planning (3). The Canadian Institute for Health Information (CIHI) (4) has confirmed that better health is associated with greater levels of income, education, employment, better housing, supportive environment, and opportunities for early childhood development. These factors may not be under the control of departments and Ministries of health in many countries. This paper will describe the extent to which integrated health human resource and service planning can and do facilitate this process in the year 2000. we shall therefore:

1. Identify how labour market analysis can be integrated into workforce planning.
2. Discuss whether planning is sufficiently responsive and flexible to retain relevance and validity in rapidly changing health systems.
3. Describe different models and approaches to linking and integrating workforce planning and service planning.
4. Discuss approaches to integrating the planning for different groups of health workers (multi-disciplinary/multi-profession planning).
5. Examine effective approaches for the use of computer-based scenario modeling to support assessment of current and future planning options.

Background

Hall describes the health human resource process as involving three major and inter-related steps: planning, production, and management (5). The focus on one component at the expense of the others will do little to ensure an effective and efficient health system. While the goal of integrated workforce planning is articulated by many, it lacks a clear definition (6). In this paper, **integrated health human resource planning** (IHHRP) involves determining the numbers, mix, and distribution of health providers that will be required to meet population health needs at some identified future point in time. It has to do with aggregate level resource planning processes in a long-term horizon. Hall (7) has identified that intermediate IHHRP should be concerned with the next 5-15 years and long term planning with 15-30 years. Longer-range planning projections involve greater uncertainty of the planning variables in comparison to intermediate range planning (8, 9).

Service planning in many countries is generally limited to shorter time periods. While some countries plan services with one- to two-year horizons, there is growing recognition that this planning must occur over a longer time span. Short-term planning is aimed at ensuring that resources for health are allocated and managed in an efficient and effective manner, and is concerned with the number and type of health resources allocated among different sectors and among human and physical capital – e.g., technology, drugs, human resources, and the renewal of existing infrastructures or planning for new ones.

If undertaken properly, both service planning and IHHRP consider an integrated human resource process and the principles that underpin good IHHRP practice also underpin good service planning. Both should be seen as part of a continuous quality-improvement process which is updated at least biannually and where each activity informs the other. Both sets of activities should be based on evidence of best practice. Labour market analysis is a useful tool for understanding the shortfalls of previous planning decisions, the current context, and provides clues for future corrective action to be taken in all planning horizons.

IHHRP and Service Planning

To ensure system efficiency and effectiveness both planning activities should be needs based and outcome directed. Furthermore, planning at all levels requires good quality data. In describing the approaches to modeling or service planning, we assume that the data that form the basis for resource planning are currently available and of good quality; that is, they are consistently reported (reliability) and that they actually measure the key variables that must be measured in order to estimate human resources requirements (validity). Needs-based approaches, in which resource requirements are based on the estimated health needs of populations, create greater data demands than the approaches required for planning based on supply/utilization. The requirement to link needs to outcomes will initially create greater data challenges. To plan services and/or to model human resources requirements without high quality data will only lead to unreliable estimates of future human resource needs and erroneous service planning models. Planning should be conducted when planners are confident that the data that underpin the estimates are of good quality. The WHO toolkit has assisted many countries to identify what data to collect – and how – for approaches to modeling and planning based on supply and utilization. Formulae and data collection guidelines are detailed in the toolkit.

The State of the Art

Government planners have used various approaches to forecast supply and demand related to health human resources (HHR) (9, 10). Traditional approaches have been further developed, and many disciplines have added unique design and analytical methods to the array of tools available to researchers. However, the wide choice of methods, the lack of comprehensive data bases, and the inaccurate projections of population growth have not improved the accuracy of forecasting (9, 11). HHRP in most countries has been poorly conceptualized, intermittent, varying in quality, profession-specific in nature, and without adequate vision or data upon which to base sound decisions (12, 9, 11, 13). The assumptions that underpin HHR modeling activities need to be evaluated for relevance and accuracy on an ongoing basis. Failure to conduct ongoing HHRP has led to the fragmentation of therapeutic tasks into sub-occupations (14). Furthermore, HHRP has only been weakly linked to national health policies (15) and population health needs (16). In the United Kingdom, human resource problems are dogging the National Health System: “Junior doctors are threatening to strike, consultants are voicing frustration, and nurses are voting with their feet. Though their concerns are less visible (...) other members of the profession allied to medicine are also facing major challenges. The problems have been well rehearsed but the solutions seem as far away as ever. If the healthcare needs of this new millennium are to be met, more radical

approaches to collaborative work will need to be explored” (Ref 17, p. 1023).” Many nurses and midwives around the world are experiencing a life where quality of work is poor, with under- and over-utilization, geographic distribution problems, role ambiguity and role overlap, particularly in relation to physicians (18).

The efficiency and effectiveness of service delivery depends to a great extent on the effective deployment and use of personnel (19). Recent findings in the *World Health Report 2000* (2) suggests that there remain great variations internationally in the level and mix of health resources (technology, drugs, hospital beds, and human resources) devoted to health care. In Thailand, health spending is primarily directed towards technology (e.g., CT scanners) and drugs rather than to human resources, whereas in Mexico and Egypt the opposite is true. However, Mexico has the highest ratio of physicians to nurses and – together with Thailand – the lowest expenditure on nurses within the case study countries (2). Yet Mexico reports that as many as 15% of physicians are inactive, underemployed or unemployed. The balance among human and physical capital inputs, the mix of human resource personnel, and the distribution of resource between urban and rural settings remain a critical issue (2, 12). To date there is but limited evidence of the use of substitution roles among human resource providers (12).

The Role of Labour Market Indicators in Planning

How can labour market analysis be used in workforce planning? Many consider that the continuous cycles of over- and under-supply of health human resources world-wide reflect the inadequate projection methods used to estimate future requirements for expanding health systems and/or the failure to consider the evidence supplied by ongoing labour market trends (6, 9, 11, 20, 21, 22). Buchan and O’May (1999) acknowledge that migration of health professionals in and out of countries must be part of HHR planning. The potential for modeling international nurse flows is limited by the international lack of mobility data for modeling (23). Ethical issues arise as they relate to the global migration of the nursing workforce. For instance, some countries produce nurses simply for export while binding these nurses to severe financial commitments to the home country. Alternatively, wealthier countries have the potential to strip the health professional workforce of poorer countries who cannot compete with the financial packages offered. Globalization and the migration of workforces have increased the need to make use of labour market indicators in planning. The International Labour Office (ILO) has played a major role in defining the Key Indicators of the Labour Market (KILM). Eighteen indicators (see Table 1) were developed based on three criteria: conceptual relevance, data availability, and compatibility across regions (website: http://www.ilo.org/public/english/employment/strat/polemp/kilm/toc_f.htm), and are intended to monitor trends. The KILM can assist countries in examining the overall status of the health workforce in the broader labour market of their country, by comparison with countries at similar levels of development (such as OECD countries) and/or by WHO regions.

The ILO intends to focus on 5 indicators (labour force participation rates; employment to population ratio; employment by sector; unemployment, under employment, and inactivity; youth employment) out of the 18 used for world comparison purposes. The capacity of countries to participate varies widely around the world. For example, there are better data bases in those countries that have regulatory bodies mandated to collect information about their professional constituency. In Canada and the WHO European Region, nursing and allied health data, population demographics, hospitals, number of beds, ratios etc are available to provide the necessary information in each of the five categories designated by the ILO (websites: www.CIHI.ca, www.statscan.ca, www.WHO.dk). However, some countries lack data, organizational structures, technical staff, electronic infrastructure and the financial resources for information technology, as well as the training required to support the collection of information. This is a challenge when there is a struggle in many countries to provide even the most basic of health care

services. However, it is important to consider that some of the current human resource difficulties experienced in some countries may be due to the absence of such data and related planning. It is recognized that “sound data on the existing numbers and distribution of human resources, especially linked to data on health system performance, can contribute to the formulation of policies and plans to address health problems” (Ref. 2, p. 90).

Table1. International Labour Organization’s Key Indicators of the Labour Market (KILM)

Participation in the World of Work	
1	Labour Force Participation*
2	Employment-to-Population Ratio*
3	Status in Employment
4	Employment by Sector*
5	Part-time Workers
6	Hours of Work
7	Urban Informal Sector Employment
8	Unemployment, Underemployment, and Inactivity*
9	Youth Employment*
10	Long Term Employment
11	Unemployment by Educational Attainment
12	Time-Related Underemployment
13	Inactivity Rate
14	Educational Attainment and Illiteracy
15	Real Manufacturing Wage
16	Hourly Compensation Costs
17	Labour Productivity and Unit Labour Costs
18	Poverty and Income Distribution
* ILO – targeting 5 or 18 indicators for world and regional estimation	

The *World Health Report 2000* (2) highlights many problems of under- and over-employment, participation rates, employment by sector, and urban sector employment. World-wide numerical imbalances (e.g., too few qualified health personnel in sub-Saharan Africa versus an overall surplus of physicians in Egypt), training and skill mix imbalances (as in mismatches between available skills and needs in Eastern and Central Asia), and distribution imbalances (urban/rural imbalances and difficult to service areas – in Cambodia for instance 85% of the population lives in rural areas but only 13% of health providers

work there) (2). These are examples of situations where careful analysis of labour market indicators could be useful to inform decision-making. In both developed and developing countries there remain significant challenges in meeting the needs of populations outside urban areas. At the present time it is difficult to make comparisons among countries across all sectors, including health.

Can Planning be Sufficiently Responsive and Flexible to Retain Relevance and Validity in Rapidly Changing Health Systems?

Flexibility, relevance and validity in planning require both ready access to timely and accurate information and the use of appropriate conceptual and analytic techniques for planning in a rapidly changing health system. Computer-based modeling eases the computational difficulties and burdens experienced in previous years. However, the component parts of these models need to be understood in order to identify the contribution of the various elements of the models to predicted outcomes. Planners must remember when planning for smaller provider groups that the smaller the group the greater the uncertainty around the estimates derived from the model. Modelers may have no choice but to use the less sophisticated analytic techniques. Excellent linkages and exchanges among key stakeholders, multidisciplinary expertise (nursing, economics, computer science, epidemiology, medicine, sociology, etc.) working in collaboration with policy and administrative decision makers and planners, and the availability of accurate and comprehensive data are thought to enhance the relevance, responsiveness and acceptance of planning activities. HHRP is an interactive process and can benefit from the experience of other sectors. However, the direct transfer of techniques must be based on careful scrutiny and a full understanding of the unit of analysis.

Health Human Resource Planning – An Overview

Integrated human resource planning involves estimating future requirements for human resources and identifying efficient ways of providing for those requirements. There is no unambiguous ‘right’ number and mix of health professionals (2, 24). Instead, health provider requirements will be determined by broader societal decisions about the level of commitment of resources to health care, the organization of delivery and funding for health care programmes, and the level and mix of health care services. Although more may always be done in terms of service delivery to meet populations’ needs, whether more should be done will depend on what other things have to be forgone in order to provide the additional resources – considerations which are essentially subjective.

Assuming that the role of HHRP research is to reduce uncertainty, public policy makers must weigh research-based facts – along with several other factors – to determine action. Yet today we know that public policy is not based on good human resource research. To add value to traditional research activities and improve “evidenced-based” decision-making requires the involvement of a number of actors including decision-makers, research funders, researchers, and other professionals in an interactive synergistic process. Each step in the process requires relationship-building and improved communication between decision-makers and researchers as well as across health sectors. Further, using evidence in decision making is a “virtuous cycle” and any weak link in the chain may interrupt the optimal flow of research into decision-making.

To complicate matters, the science underpinning HHR planning is young. Approaches to estimating human resource requirements have been few and plagued with methodological and conceptual limitations. One key challenge has been the lack of easily accessed clinical, administrative and provider data bases to conduct complex modeling activities such as the use of data based on health needs, system and caregiver outcomes, as well as management information systems which reflect utilization and costs.

Governments require a variety of human and material resources to inform the policy decisions related to HHR. Ministries also need the following resources: visionary project leaders who have epidemiological, human resource planning and modeling knowledge and who are familiar with the health services being modeled. These individuals must work within government structures that have responsibility for HR policy decision-making and benefit from political support and financial resources in order to take action on HHR decisions.

As O'Brien-Pallas (25) notes with respect to nursing resources, nurse planning does not exist in isolation from the world in which these services are delivered. Future planning models must explicitly place the health care industry in the general context of the economy. Lavis and Birch (24) also note there is no unambiguous right way to model human resources. Instead, the conceptual basis for human resource planning will depend on the question(s) being asked. Do we want to know how many nurses or physicians are required to continue to serve populations in the way they are currently served? or how many are required to support the services required to meet all (or part) of the expected needs of the population? or how many are required to satisfy the expected development and plans for the future provision of health care services?

Birch et al. (26) refer to these three approaches as utilization-based, needs-based and 'effective demand'-based approaches to human resources planning. The 'unit of analysis' across the different approaches is the same –physician consultations, dentist courses of treatment, and nursing hours, but the underlying 'driver' of this measure differs and reflects the various ways in which societies think about the delivery of health care, the provision of services, the population's needs, and the commitment of society's scarce resources. In some ways, each approach builds upon the principles of the previous approach and introduces additional considerations (26). Although this might be seen as enriching the applicability of the approaches to epidemiological, economic, and political realities – and hence enhancing the policy relevance of the analyses, the philosophical basis of the particular health care system being studied is of importance. For example, in societies where health care services are delivered through private markets and access to services is determined by the individuals' willingness and ability to pay for services, there would be little value in basing future requirements for nurses or other health providers on the estimated needs for care of the population, or on the estimated future commitment of government resources to health care, since neither of these factors will be paramount in determining the future deployment of available health providers. In this way, the future plans for funding, delivery, and configuration of services determine the appropriate approach to be followed.

Needs-Based Approach

A needs-based approach approximates most closely that described by WHO. The needs-based approach estimates future requirements on the basis of the estimated health deficits of the population as well as on the potential for addressing these deficits using a mix of different health care human resources to provide effective service intervention in efficient ways. Nursing requirements are therefore an epidemiological concept, based on the age- and sex-specific needs of the population – needs that are independent of current service utilization but are interdependent with the requirements for other health human resources. This approach avoids the perpetuation of existing inequities and inefficiencies in the deployment of nursing or other health provider services. Insofar as current needs are not all met, unmet needs will be included in the estimation process. Similarly, the estimation process will not be 'contaminated' by any current inappropriate use of services.

The approach is based on three underlying assumptions:

1. All health care needs can and should be met.
2. Cost effective methods of addressing needs can be identified and implemented.
3. Health care resources are utilized in accordance with relative levels of need.

Although it has the advantage of focusing attention on the efficient use of resources within the health care sector, this approach ignores the question of efficiency in the allocation of resources between health care and other activities. The allocation of resources between sectors of the economy is essentially a political decision. Needs for care may be an important input into this decision, but they are unlikely to be the only one.

A second issue that arises from the needs-based approach is that there is no *a priori* reason why resource requirements derived from a needs-based approach will necessarily be used to meet needs. Human resources may be used to meet demands that do not coincide with underlying needs while the needs of ‘hard to reach’ populations may remain unmet. In this way, even estimates based on needs-based approaches may appear to be inadequate to meet all needs – because of inefficiency in the use of nursing resources, for example – and this may lead to demands for further increases in nursing resources. In other words, the epidemiological principles underlying the needs-based approach must be linked to economic principles about the opportunity costs of resources, both within and beyond the health care sector.

Utilization-Based Approach

Under this approach the quantity, mix, and population distribution of current health care resources are adopted as a baseline for estimates of future requirements. The level of utilization of HHR services is expressed in relation to the demographic profile of the population to produce subgroup-specific average rates of provider utilization.

The population characteristics used are generally confined to age and sex, since there is evidence that health care needs vary systematically according to these factors. Age- and sex- specific rates of utilization are applied to estimates of the future size and demographic profile of the population to produce nurse requirements for the future. In principle, this range of characteristics could be increased to incorporate other population characteristics related to needs. However, the confounding influence of variations in supply on variations in populations’ use of services have tended to deter researchers from incorporating these factors in the utilization-based approach. In its simplest form the approach is based on three broad assumptions:

1. The current level, mix, and distribution of nursing services in the population are appropriate.
2. The age and sex specific resource requirements remain constant in the future.
3. The size and demographic profile of the population changes over time in ways predicted by currently observed trends in age and sex specific rates of mortality, fertility, and migration patterns.

The validity of any one of these assumptions is arguable. Markham and Birch (27), for instance, note that practice patterns and modes of delivery are continually developing over time in ways that affect the per capita use of specific provider-specific services. Indeed, applications of the approach have relaxed some of the assumptions – Denton et al. (28) consider alternative assumptions about trends affecting the future demographic profile of the population. However, the underlying question remains, “How many nursing (or other provider resources) hours will the population use in the future?”. But as patterns of behaviour such as smoking and alcohol consumption change over time the health risks associated with these behaviours will change, with consequences for the demographic profile of service requirements. Similar arguments can be made about changes in environmental exposures, employment profiles, and many other factors associated with health risks. Markham and Birch (27) argue that the main problem arising from this approach is that from a policy perspective; it overlooks the consequences of the ‘errors’ arising from these assumptions proving to be invalid. Because service utilization is not independent of supply, any overestimate or underestimate of requirements will be reflected in changes in the levels of services per capita population (i.e., service intensities). Thus, current service intensities, which form the basis of the

utilization-based approach, emerge from the estimating errors of the past and not from the epidemiological characteristics of the present or even from the current willingness and ability of the population to pay for services.

Effective Demand-based Approach

Under the effective demand-based approach, economic considerations are introduced to complement the epidemiological principles of the needs-based approach. As Lomas et al.(29) argue, fiscal resources have not historically been factored into projecting supply requirements, presumably because the forecasting task has been seen as an attempt to assess requirements based on needs. Because of the social nature of healthcare needs, the assumption has been made that resources could be found. However, we have seen that definitions of need are less than precise and, more importantly, that there are clear possibilities for resource trade-offs. It would be unwise, therefore, to omit fiscal resource constraints in future forecasting exercises” (p. 419). The approach remains interested in ensuring that human resources are deployed efficiently (i.e., in ways that have greatest impact on health needs). But, by relaxing the assumption that all needs can and should be met, the approach can focus on relative levels of needs within the entire population affected by those needs.

Using this approach, the starting point is to estimate the future size of the economy for which nursing services as well as all other commodities are to be funded. This estimate is then used to assess the proportion of total resources that might be allocated to health care, and the share of this health care allocation that should be devoted to nurse or other provider resources. Epidemiological information on the level and distribution of needs in the population interact with the roles that nursing or other provider human resources can play in meeting those needs for different health human resources. In many countries, special consideration of economic issues may have better prepared us for the ultimate swing in over- and under- supply of nursing personnel we currently face.

The Pakistan Story

In many countries, the regulatory body is a repository of information relating to supply and labour market indicators. In some countries however, the regulatory body lacks even the most basic information on its members. In Pakistan, data on both labour force and labour market are incomplete, fragmented, and not readily available. In her study Amarsi (30) has noted, “the nursing human resource development situation is unclear” (p. 78) ,and identified an excess demand for nursing personnel, but no ability to evaluate current utilization and distribution of nurses. The lack of quantitative data Amarsi (30) has led her to use a qualitative approach in order to investigate critical issues in health human resources for nursing.

A four-year programme, entitled *The Development of Women Health Professional Programme (DWHP)*, focuses on the need to collect quantitative data on the nursing workforce and to develop an integrated data system. A computerized database developed at the regulatory body provides quantitative as well as demographic information on licensed nursing personnel within each cadre of the profession. That information has negated many of the widely accepted perceptions regarding labour force participation. Contrary to popular belief, many women continue to work in nursing after marriage and motherhood. Reliable information on the number of nursing personnel in each cadre demonstrates the gap between the number of nursing personnel reported in government planning documents (35 000) and that observed in reality (15 000) as regards registered nurses.

The computerized database developed at the nursing examination boards provides information on the students enrolled in basic nursing educational programmes and on newly qualified nursing personnel. Profiles of the student body and new graduates became available to planners. The development of a

computerized data base on the labour force participation (e.g., distribution across facilities, hours of work, status in employment, underemployment, unemployment) encountered numerous problems as the information coming into the central nursing offices was unreliable and incomplete. The need for a comprehensive on-site survey of each service and educational facility in the country became an essential first step. Once a data-gathering tool has been developed and pre-tested (31) and, once this functional, will be linked to the other data sets, providing a comprehensive data base readily available for planning.

Before 1995 there were no databases on the nursing labour force and no ability to forecast the number of nurses that would be needed. The situation in Pakistan demonstrates the need for an infrastructure with the capacity to gather reliable and valid data and to establish linkages with information systems on other health care providers and on the changing market conditions for labour. At the same time there is considerable pressure “to upgrade human resources through continued expansion of education and health services” (p. 374; 32).

Is Simulation the Answer?

O’Brien-Pallas et al. (9) have built a dynamic system-based framework that takes into account:

1. Population characteristics related to health levels and risks (needs-based factors)
2. service utilization and personnel deployment for nurses and others who provide similar or the same services (utilization-based factors)
3. the economic, social, contextual, and political factors that can influence health spending (effective demand-based factors)
4. population clinical and health status elements, provider and system outcomes resulting from the different types of nurse and other health provider utilization.

This model incorporates each of the three methodological approaches outlined earlier but places these approaches in the context of the assessment of needs and outcomes for service provision. Simulations of the health system provide needs-based estimates that are used to optimize outcomes. Members of the research team are currently testing the practical applications of the model.

Simulation is a powerful technique. Hall (7) suggests that it allows planners to explore consequences of alternative policies, facilitates input and output sensitivity analysis, and makes it easier to involve stakeholders throughout the process. Simulations are a means to assist planners to make decisions; they are not an end in themselves. The extent to which simulation provides useful scenarios for consideration depends on the quality of the data used in the model and on the extent to which the variables modeled reflect the system as a whole. In tracing key challenges to the use of WHO’s simulation tools through the 1990s, Hall (7) found the following:

1. Planners want short-term estimates since they may be reluctant to project “estimates”, in the longer term because of complex data requirements.
2. Planners do not understand the concept of scenario testing and view scenarios as outcomes rather than as information to be used by planners in order to influence the training and deployment of health professionals and hence avoid or reduce the probability of shortfalls or surpluses in health planning.

Personnel to population ratios, population based rates and utilization-based rates have been used as the basis for computerized simulations (33, 34, 35). However, these are not considered to be typical simulation models. They are static models and lack the capacity to examine the dynamic relationships among inputs/outcomes. Although techniques such as production functions, linear programming, and Markov

chains are attractive because the resulting models can be solved analytically, they often require significant simplification of a problem to make it fit the required form. Simulation is much more flexible, in that it can model the evolution of a real-world system over time according to mathematical or logical relationships between objects and to probability distributions. Rather than generating an exact mathematical solution, an iteration of a simulation generates one possible outcome. The model is run repeatedly to get an estimate of how the system will behave overall. Simulation probably offers the most useful tools for assessing substitution across and within professions and for addressing issues such as the geographic distribution of health personnel. Simulations are often used to analyze ‘what if’ scenarios, a capability essential for use in health system planning. While they are easier to apply than analytical methods and require fewer simplifying assumptions, simulations can be costly to implement because of their detailed data requirements.

Two commonly used approaches to assessing uncertainty in health projections are deterministic sensitivity analysis and stochastic simulation (36, 7). Song and Rathwell (36) developed a simulation model to estimate the demand for hospital beds and physicians in China between 1990-2010. Using a simulation model they compared deterministic sensitivity analysis and stochastic simulation for the assessment of uncertainty in health projections. Their simulation model consisted of three sub-models: population projections, estimation of demand for medical services, and productivity of health resources. The outputs for the model included the number of hospital beds and the number of physicians required for the future. They produced three estimates, including the low and high limits, and the most likely value for each variable. Their findings indicate that the stochastic simulation method uses information more efficiently and produces more reasonable average estimates and a more meaningful range of projections than deterministic sensitivity analysis. However, Hall (7) cautions that detailed data requirements required for stochastic modeling usually make it difficult to use the stochastic model approach in developing countries.

Other Approaches

More recently, Bretthauer and Cote (37) have tested a model and solution method for the planning of resource requirements in Health Care Organizations. To determine resource requirements, they developed an optimizing/queuing network model that minimizes capacity costs while controlling for a set of performance constraints, such as setting an upper limit on the expected amount of time a patient should spend in the unit. This model needs further testing. However, it may be applied to capacity planning in a variety of health care settings, including the community.

Anderson and colleagues (38), describe a managed care model for projecting the number of otolaryngologists required in the United States. They suggest that unless assumptions are clear, different models used for the prediction of health human resource requirements will produce different results. This is a conclusion previously reached by Birch et al. (26) and O’Brien-Pallas et al. (39, 40). Whatever method used, O’Brien Pallas et al. (9), Song and Rathwell (36), and Eyles et al. (41) suggest that estimates for requirements will not be exact numbers but a range of numbers. As models are developed further, sensitivity analysis will allow policy makers and planners to have different estimates of required resources from which to plan their service need and HHRP. The importance of continuously updating estimates cannot be overstated.

Are We Doing IHHRP Today?

There are limited indications that we have moved closer to IHHRP-based modeling. The published literature since 1995 continues to stress the need for IHHRP today, but few peer-reviewed publications discuss the results of such studies. Grey literature from WHO describes some of the structural and process factors needed for IHHRP and indicate that these activities are underway at the region and country

level. The outcomes of these analyses have been hard to access despite a thorough search at WHO Headquarters and regional offices. Access to these findings on web pages would contribute to the science of IHHRP. While ‘pre-packaged’ methods for planning human resources are attractive because they offer documented methods for immediate action, approaches to planning must consider the goals of the exercise and the desired outcomes. Trade-offs between conceptual and analytic advances, as well as rigour and ease of use, must be carefully considered in light of the user’s situation and the future orientation of planning.

Cooper (8) uses supply-based statistics to emphasize the need for integrated planning. Professions included in this exercise include physicians, and the ten most common non-physician clinicians (NPC) whose roles most strongly overlap with physician services. The non-physician groups include traditional NPCs like nurse practitioners (NPs), certified nursing midwives (CNMs), and physician assistants (PAs); alternative disciplines including chiropractors, naturopaths, practitioners of acupuncture and herbal medicine; and specialty disciplines including optometrists, podiatrists, certified registered nurses anesthetists (CRNAs) and clinical nurse specialists (CNS). Many of the practitioners are being prepared for primary care roles. Projections until 2005 revealed that, given supply and current enrollments in educational programmes the number of NPCs would increase by 68% between 1995 and 2005. This is at a time when Cooper estimates there will be a surplus of physicians in the US. If maldistribution problems of providers can be corrected, the potential impact of the surplus may be somewhat mitigated. The study has several methodological limitations but does point to the needs for linking national and state workforce planning with the actual production of personnel and the integration of both. The author notes that the relationship between the demand for physicians and that for NPCs needs further evaluation. A link to needs of the population and health and system outcomes would provide the context for a thorough investigation of these issues.

Most of the approaches to IHHRP models described in the WHO Toolkit are utilization- or supply-based subject to challenges of the related assumptions – as was the case in the Cooper study. The toolkit approach to determining future requirements for integrated workforces uses among other things the ratio of other professions to the number of physicians. As health restructuring moves out of the hospital or clinic setting to non traditional service settings, the number of ‘other’ personnel, may have to be “unbundled” from the data related to physicians in order to ensure that practices as defined in country and professional legislation are fully addressed. Inefficient substitution could lead to duplication of services.

IHHRP must determine the numbers of health professional required to meet population health needs and examine questions such as substitution and skill levels within and among professional cohorts. WHO (2) states that the relative price of different skill categories should guide decisions about the most efficient mix where labour markets are functioning. No direct account is taken of outcomes of interest. The basic goal of human resource planning is to ensure that populations in need receive essential services. In countries where some degree of planning is possible, de-skilling of the workforce must be carefully considered. In the case of nursing, recent literature has demonstrated that higher skill levels are associated with reduced incidence of nosocomial infections and adverse events (42, 43, 44, 45). This knowledge must be balanced with country realities in the short term – goals for future planning must include the notion of the right level of professional training, in the right place, to achieve best outcomes. Decisions on the skill levels of providers must be made judiciously and must take into account the evidence of ongoing research.

Restructuring initiatives in many countries have been driven by fiscal policy considerations rather than by the need to realign the system towards better outcomes. In the late 1990s, industrialized nations have faced two important challenges:

1. The non-viability of the welfare state.
2. Demands for wide ranging services from consumers (46; website: www1.worldbank.org/publicsector/civilservice/oecdcountries.htm).

The resulting activities of reform led to redesign of the government approaches with a focus on decentralization and local accountability. However, job losses occurred as a by-product of this process of “reinventing governments and reforms”. Resulting initiatives to retrain and assist with job searches to enhance re-employment opportunities have led to disappointing results. For example, registered nurses and other health professional were laid off or moved to part-time employment to reduce costs. However, these planning decisions have had some unanticipated consequences. In Australia, Canada, the United Kingdom and the United States, for example, nurses were laid off or became unemployed or underemployed. The media and others quickly identified that there was no certainty of full-time employment upon graduation. Enrollment in nursing schools declined as a consequence, partly through programme closures and partly because of a severe drop in the applicant pool as young men and women chose other career options with better employment potential. Nurses who remained in the system report concerns about unsafe practice environments and severe work overload. Given the transition period between programme entry and graduation – even though enrollments have now increased in the meantime – the impact of the reduced production of new nursing personnel is occurring at exactly the time when the supply of nursing personnel is decreasing because of aging of the nursing workforce. There is thus a potentially severe shortage in nursing. Changing public policy and the public perceptions of nursing as a career option and improving the work environments for nurses in order to attract new nurses and retain the aging nurses now in place will be difficult in the short time available. The nursing situation described above is true for other health disciplines such as physicians. Analysis of the potential impact of planning decisions must consider many factors that can influence both short and long term consequences.

Conclusion

This paper provides an analysis of how labour market indicators can be integrated into service planning, discusses whether planning is sufficiently responsive and flexible to retain relevance and validity in rapidly changing health systems, describes various models and approaches towards linking and integrating workforce planning and service planning, discusses methodological approaches to integrating planning and examines effective approaches to the use of computer based scenario modeling in support of the support assessment of current and future planning options. The context and broad cross-cutting themes of public sector, political, social, and macro-economic changes have been considered, using actual country examples. Where publications exist, empirical evidence serves as the basis for this analysis.

While strides have been made in resource planning, the following key themes emerge from this paper including:

1. Few empirical applications of the conceptual frameworks have been developed in the last 10-15 years.
2. Integrated and discipline-specific empirical applications are in place but do not build upon conceptual and analytic advances.
3. Discipline-specific studies still dominate the literature.
4. Labour market indicators, if collected, play an important role in planning for the workforce.
5. Many applications do not show a link to outcomes.

6. Modest financial investments to build upon conceptual and analytic advances and data requirements may result in large payoffs that greatly exceed investments,
7. The opportunity costs of not moving forward and relying on old methods must be considered (continued reliance on primarily supply and utilization based approaches have led to cycles of over and under supply approximately every four to five years in the physician and nursing workforce).

In order to move into the 21st century we need to make a concerted effort to move away from old and safe approaches and embrace conceptual and analytic complexity, with a focus on outcomes and integrated planning, in order to provide an efficient and effective health service for future generations.

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Annex 1

Annotated Bibliography

Article: An overview of NHRD literature

Authors: Amarsi, Y., French, S. E., Baumann, A., Herberg, P., O'Brien-Pallas, L. L., Donner, G., Mallette, C., & Peterson-Rudnicki, W.

Source: Nursing Effectiveness, Utilization and Outcomes Research Unit, University of Toronto & McMaster University, 1998 (unpublished doctoral dissertation)..

Abstract:

The authors examine the relevance of predictive models of health human resources to Pakistan. Moreover, the authors elaborate on human resource development and present the guidelines for comprehensive health human resource planning (HHRP) developed by T.L. Hall. This work builds on the work of Hall, Reid and the SHARP model (developed by Denton, Gafni and Spencer). They find that the demand for health care providers is increasing in Pakistan because of population growth, improved technology, shift in pattern of disease, rising social expectations, and the rapid growth of health industry. They identify the following issues: poorly prepared practitioners; poor linkages among health care needs and education; surplus of physicians; shortages of all female health care workers; imbalances between urban and rural; poor link ages between national health policies and implementation; lack of political will to implement policies; unsatisfactory career structure; poor health care funding; limited historical data. They underline that the process of HHRP is being ignored in Pakistan and that the issues identified must be incorporated in future health human resource planning

Article: The Answer is... Now what was the question? Applying alternative approaches to estimating nurse requirements

Author: Lavis, J.N. & Birch, S.

Source: Canadian Journal of Nursing Administration, 1997, 10(1): 24–44

Abstract:

In this article, the focus is shifted from the theoretical to the empirical in order to identify the challenges and opportunities presented by the previous alternative approaches. There are three implications for estimating human resource requirements which have emerged from the conceptual discussions: 1) there is no unambiguous “right” number of nurses, or any other health care resource 2) there is no unambiguous “right” way of estimating nurse requirements for the future and 3) the appropriate method is conditional upon (or determined by) the question being put forth. The main conclusion of these implications is that attempts to estimate nursing requirements for the future should begin by addressing the question of “required for what?” The article turns its focus on the application of the three approaches to the challenge of estimating nursing human resource requirements for Ontario until the year 2010 and identifies gaps in the availability of data for each approach. The estimates are based on a research project funded by the Nursing Human Resources Data Centre at the University of Waterloo. In terms of needs-based estimates, the integral data gaps result from the unmanageable and unfeasible undertaking of demographically comprehensive population-based surveys and lack of information regarding optimal mixes of health care and other resources for meeting population-based needs. Due to the lack of data that

would permit the application of a needs-based approach to estimating nursing requirements, notions of utilization and effective-demand have been integrated into needs-based frameworks, producing “hybrid models” – this inevitably change the nature of the information produced for the policy process. The authors ask four questions that may offer guidance in progressing with general health care HR policy and estimating nurse requirements in particular:

- I. What is the goal of health care human resource policy as it applies to nursing requirements?
- II. How might that goal be served by the alternate approaches to estimating HHR requirements?
- III. What use can be made of existing data sets to inform this (or other) policy goals?
- IV. (How) can more appropriate data be collected to serve these policy needs and how can data collection be best organized to serve these purposes?

Article: **Back to the future: A framework for estimating health care human resource requirements**

Author: **Markham, B. & Birch, S.**

Source: **Canadian Journal of Nursing Administration, 1997, 10(1): 7-23**

Abstract:

This article identifies and analyses alternative ways for estimating health care human resource requirements, broadly approached in terms of utilization, based, needs-based and effective demand-based requirements. Three methodological paths are identified and defined for estimating future levels of requirements: (1) projecting (2) forecasting and (3) planning. The utilization-based approach is based on three broad assumptions (p 11) which prove to be invalid in most cases and the associated process overlooks errors in the longer term. The needs-based approach is identified as avoiding the perpetuation of existing inequalities and inefficiencies in the deployment of health resources, and in its purest form, faces problems of political or fiscal reality. There are also some significant limitations with this approach in that if mechanisms are not in place to ensure that resources will be used efficiently, there may still be some needs that are met inadequately or not at all. Needs-based approaches to human resources planning may indicate that more resources are required to meet needs when, in practice, better management of resources is needed. However, even in an “unpure” form, the needs-based model gives recognition to the fact that current deployment of health care human resources is less than optimal in terms of the type and quantity of services provided. Data requirements in order to apply the needs-based approach to population needs are substantial. The effective demand approach is constrained by the expected availability of resources and involves four broad steps: 1) estimating the size of the economy 2) estimating the proportion of society’s total resource pool allocated to health care services 3) estimating the purchasing power of resources in the health care sector and 4) estimating the proportion of this real resource allocation to be devoted to the employment of health care human resources. Epidemiological and/or economic considerations concerning population health may be part of these estimates insofar as they are used by government agencies to develop planning guidelines, policy directions or organizational developments. Each set of assumptions within the three approaches represents a “static” usefulness for health care HR policies in that they address estimated requirements based on assumptions of “how the world must work”. In

so far as the world does not work in these ways, the approaches represent ways of thinking about health care human resource issues that have different contexts and questions. Importantly, two significant and broad questions must be addressed in order to develop relevant health care HR estimates:

- I. When assessing requirements for HHRP, what priority should be given to (a) human resource supply levels (b) levels of health care needs in the population (III) societal willingness to fund health care?
- II. What factors should be used to inform requirements estimates under the chosen approach?

Article: Nursing Requirements for Ontario over the next 20 years: Development and Application of Estimation Methods

Authors: Birch, S., Lavis, J., Markham, B., Woodward, C., & O'Brien-Pallas, L.

(47) Source: **CHEPA, McMaster University, 1994.** (CHEPA Working Paper Series Paper 94-13).

Abstract:

The authors develop a framework to estimate the need for nursing human resources in Ontario, Canada. Using a multi method analysis, they evaluate three approaches to health human resource planning, including needs-based, effective demand, and utilization based, to determine the nursing resource requirements in the province. Studying registered nurses and registered practical nurses in the province of Ontario using a variety of instruments and administrative databases, they find that the three approaches yield different estimates for the requirements in nurses for the year 2010 –the estimates are illustrative and not to be used for planning. The authors suggest that HHR requirements are essentially choices about the types and quantities of services. The choices based on underlying values of society need a large research endeavour to conduct studies and good quality databases. In addition, they reinforce the need to blend conceptual approaches and examine the cost-effectiveness and efficacy of alternative methods to supply services.

Article: Nursing numbers in Britain: The argument for workforce planning

Author: Buchan, J. & Edwards, N.

Source: British medical Journal, 2000, 320: 1067-1070

Abstract:

The authors describe the historical cycle of nursing shortages in Britain . They examine the impact of demand factors and supply on the nursing workforce and suggest that long-term integrated workforce planning processes be put in place for responsive health human resource planning . They warn the reader that integrated planning is necessary, but not sufficient . In addition to determining the right number of nurses, it is imperative to consider the strategies for effective recruitment, retention and production. The authors stress the importance of developing a systematic and integrated approach to workforce planning to improve medium to long term planning And suggest urgent and concerted action in the short term.

Article: **Health sector reform and human resources: Lessons from the United Kingdom**

Author: **Buchan, J.**

Source: **Health Policy and Planning, 2000, 15(3): 319-325**

Abstract:

The objective of the paper is to assess the human resource (HR) dimension of the National Health Service (NHS) reforms in the United Kingdom, and to highlight lessons for the health systems of countries undergoing reform or restructuring. Health sector reform in many countries in the 1980s and 1990s has focused on structural change, cost containment, the introduction of market mechanisms and consumer choice. This focus has inevitably challenged the ways in which health professionals and other staff are employed and deployed. The methods used to manage human resources in health care may also in themselves be a major constraint or facilitator in achieving the objectives of health sector reform. The paper assesses the impact of the NHS reforms on the HR function by examining three central requirements of the latter: to maintain effective staffing levels and skill mix; to establish appropriate employee relations policy and procedures; and to be involved in pay determination. The paper concludes that the most significant changes which have occurred as result of the NHS reforms have been concerned staffing change and organizational culture, and the individual attitudes of NHS management and staff. Attempts to alter methods of conducting employee relations and determining pay and conditions of employment have been less successful. However, an overall approach to HR management, which would have been unthinkable in the pre-reform NHS, is now accepted, albeit grudgingly by some, as the way forward. In general, the changes in the NHS HR function can be characterized as a partially successful attempt to adopt private sector HR management techniques to meet the challenges of public sector reform.

Article: **Current and projected workforce of nonphysician clinicians**

Authors: **Cooper, R., Laud, P., & Dietrich, C.**

Source: **The Journal of the American Medical Association, 1988, 280(9): 788-794**

Abstract:

This study examines ten types of health workers including: nurse practitioners, physician assistants, nurse-midwives, chiropractors, acupuncturists, naturopaths, optometrists, podiatrists, nurse anesthetists and clinical nurse specialists. The report shows that the aggregate annual number of graduating nonphysician clinicians (NPC) has doubled between 1992-1997, and a further increment of 20% is projected for 2001. Assuming that the enrollments remain stable, the NPC supply is set to grow from 228 000 in 1995 to 384 000 in 2005. The greatest growth is projected among those who provide primary services. The greatest concentration of both practicing NPCs and NPC training programmes occurs in those States with the greatest abundance of physicians. On a per capita basis, the projected growth in NPC supply between 1995 and 2005 will be twice that for physicians. Further expansion of both NPC and physician supply will need careful consideration.

Article: Nurse market policy simulations using an econometric model

Authors: Deane, R. T., & Yett, D. E.

Source: Research in Health Economics, 1979, 1: 255-300

Abstract:

This model conceptualizes the nurse market as being made up of ten separate fields: hospital directors of nursing service, nurse supervisors, head nurses, general duty nurses, nurse educators, office, private duty, public health, school, and industrial nurses. For each of these fields, the model explains actual employment, desired employment, vacancies, vacancy rates, job quits, retirements, and annual hires. In addition, it estimates all wages except those for nurse educators, public health, school, and industrial nurses, which are exogenous to the model. Since the model explicitly incorporates monopsonistic/oligopsonistic elements into the hospital nurse fields, the number of "equilibrium" vacancies and "equilibrium" vacancy rates are also estimated for each of these fields. In addition, the authors generate estimates of the total nurse employment, the nurse labour force, the total stock of nurses, participation rates, unemployment, and other pertinent variables. In total, the model explains 131 variables; but requires the manipulation of only 24 exogenous variables for forecasting purposes.

In order to embody the market theory, the model should be local in character. On the other hand, the data available apply to the total industry. The result is a model that, instead of representing any single local market, represents an average or typical local market but, because industry wide data are used, forecasts aggregate quantities. Therefore, the model explicitly retains its microeconomic theoretical basis, yet deals with aggregate quantities: with minor modification, and given sufficient data, the model allows handling conditional predictions for individual market.

Article: Potential savings from the adoption of nurse practitioner technology in the Canadian health care system

Authors: Denton, F. T., Gafni, A., Spencer, B. G., & Stoddard, G. L.

Source: Socio Economic Planning Sciences, 1983, 17(4): 199-209

Abstract:

An investigation of the potential for reducing aggregate medical costs by the introduction of nurse practitioners into the Canadian health care system to an extent consistent with demonstrated safety and effectiveness. Includes a cost model for this purpose, with estimates of its parameters. The cost model is coupled with a demographic projection model and a simulation of potential cost reductions over the period 1980-2050, under alternative assumptions. Results suggest that savings could have been in the range 10-15% in 1980 for medical services as a whole, and 16-24% for ambulatory services. The estimated savings percentages are quite insensitive to projected changes in the age structure of the Canadian population. (From author abstract)

Article: Reshaping the NHS workforce: Necessary changes are constrained by professional structures from the past

Author: Doyal, L. & Cameron, A.

Source: British Medical Journal, 2000, 320(7241): 1023-1024

Abstract:

Describes the challenges associated with working in interdisciplinary teams in healthcare. The author argues that more radical approaches to workforce planning are needed to deal effectively with recurring challenges in health human resource planning for different occupational groups such as nurses, physicians, and social workers. New mechanisms for integrated workforce planning and managing human resources in the health sector should be developed. The need for teamwork between individuals providing the services and institutional levels is emphasized.

Article: Rethinking human resources: An agenda for the millennium

Authors: Martinez, J. & Martineau, T.

Source: Health Policy and Planning, 1998, 13(4): 345-58

Abstract:

Health care reforms require fundamental changes to the ways in which the health workforce is planned, managed and developed within national health systems . The issues involved in such transition remain complex; their importance and the need to address them in a proactive manner are vital for reforms to achieve their key policy objectives . Analysis of human resources in the context of health sector appraisal studies must improve in depth, scope and quality by incorporating functional, institutional and policy dimensions.

Article: Supply projections as planning: A critical review of forecasting net physician requirements in Canada

Authors: Lomas, J., Stoddart, G. L., & Barer, M. L.

Source: Social Science and Medicine, 1985, 20(4):411-424

Abstract:

Critical review of the methods currently used to establish future physician manpower needs. Based on data from one American and two Canadian studies (Low, 1981; Health and Welfare Canada, 1975; US Report on Graduate Medical Education Advisory Committee, 1980) the review highlights the issues inherent to the supply side models: specialty groups may overestimate requirements; aggregation across the nation assumes equal distribution of physicians; need is assumed to remain constant over time; point estimates of numbers are disregarded and only ranges are provided; productivity is difficult to measure needs are confused with current utilization; and quantification is selective. The authors caution readers that use of supply side models can lead to serious biases in outcome if it concentrates on the medical technical definition of need. They reinforce the need to include measures of the context in which care is occurring and the need to test substitution in models.

Article: An evaluation of WHO resolution 45.5: Health Human Resource Implication

Author: O'Brien-Pallas, L., Hirschfeld, M., Baumann, A., Shamian, J, Adams, O., Bajnok, I., Isaacs, E., Land, S., Salvage, J., Birch, S., Miller, T., Islam, A., & Luba, M.

Source: Canadian Journal of Nursing Research, 1999, 31(3): 51-57

Abstract:

The World Health Assembly approved resolution WHA45.5 in 1992 . This paper reports the findings of the evaluation of the implementation of this resolution using a survey technique . One hundred and fifty WHO Member States responded, a 79% response rate . Study findings suggest that the greatest strides world-wide have been made in education . While progress has occurred at country level, far more action is needed to strengthen nursing and midwifery if these cost-effective resources are to play a decisive role in improving the coverage and quality of services to people, especially those in greatest need.
Article: A comparison of workload estimates using three methods of patient classification

Authors: O'Brien-Pallas, L. L., Leatt, P., Deber, R., & Till, J.

Source: Canadian Journal of Nursing Administration, 1989, 2(3): 16-23

Abstract:

This research examined the equivalence of the workload estimates of three patient classification systems commonly used in nursing (GRASP, PRN, and Medicus) . Patient classification systems are used for programme costing and formulation of nursing budgets . The findings suggest that the estimates of absolute hours of care provided by the three systems differ significantly when all three tools are used on the same patient population, particularly in the Intensive Care Units (ICUs) . These differences may result from the weights assigned to individual indicators within each system . Although hours of care estimates are significantly different, they are highly correlated . Estimates of hours and costs provided by different patient classification system may involve clinically important differences. These discrepancies could result in inequitable funding practices unless mechanisms are developed for showing the relationships between systems.

Article: Different systems, different costs: An examination of the comparability of workload measurement systems

Authors: O'Brien-Pallas, L.L., Cockerill, R., & Leatt, P.

Source: Journal of Nursing Administration, 1992, 22(12):17-22

Abstract:

This study examines the equivalence of the hours of care estimates of four patient classification/workload measurement systems. Although hours of care estimates of the systems are similar, differences between the estimates can be as high as 4.53 hours per day for the same patient. The researchers develop relational statements that make hours of care estimates equivalent for all systems studied. System differences can have a profound impact on nursing unit and department budgets, if not adjusted.

Article: **Shaping the health future in Turkey: A new role for human resource planning**

Author: **Ozcan, S., Taranto, Y., & Hornby, P.**

Source: **International Journal of Health Planning and Management, 10, 305-319, 1995.**

Abstract:

The expanding health needs and expectations of a growing and changing population in Turkey are placing new pressures on a health system that is increasingly constrained financially . These pressures are bringing into sharp focus the need to take radical approaches to the organization, planning and management of the health sector; and, in particular, in the planning and management of health human resources . Issues of effectiveness, efficiency and value for money are increasingly becoming the central issues for the 1990s and beyond . The article examines the development of the Turkish health system . Within a framework of health care reform proposals emerging from a major development project of the Ministry of Health, the text explores current initiatives and future needs in developing human resource planning if the health care reforms are to be successful in meeting the health needs of the population

Article: **Managing the U.S. health care workforce: Creating policy amidst uncertainty**

Author: **Schroeder, S.**

Source: **Inquiry ,1994, 31(3): 266-75**

Abstract:

This author argues that managing the health care workforce will have important implications for costs, quality, and access . Factors influencing supply include: the production of new professionals; their relative effort; and rates of retirement. Demand is described as being influenced by the development of new diseases, new drugs, and techniques, as well as by the growth of managed care, which uses fewer physicians, fewer specialists and more midlevel practitioners. The consensus is that there are too many physicians, especially specialists. Reducing the number of residency positions would reduce supply, predominantly by slowing importation of international physicians. Obstacles to workforce reform include a distrust of supply projections, skepticism about governmental planning, the conservatism of established institutions and the fact that some hospitals would lose positions and resources.

Article: **Stochastic simulation and sensitivity analysis: estimating future demand for health resources in China**

Author: **Song, F. & Rathwell, T.**

Source: **World Health Statistics Quarterly, 1994, 47(3-4): 149-56**

Abstract:

A simulation model to estimate the demand for hospital beds and physicians in China between 1990-2010. The model is used to compare deterministic sensitivity analysis and stochastic simulation in assessing inherent uncertainty in health projections. The stochastic simulation method uses information more efficiently, and produces a more reasonable average estimate and a more meaningful range of

projections than deterministic sensitivity analysis. However, it may be preferable to combine the use of both approaches because they have different, complementary, advantages and disadvantages. The authors stress the usefulness of three value estimates of input variables; the benefits of triangular distribution for stochastic simulation should be emphasized in health projections.

Article: The evolution of divergences in physician supply policy in Canada and the United States

Authors: Sullivan, R. B., Watanabe, M., Whitcomb, M. E., & Kindig, D. A.

Source: Journal of the American Medical Association (JAMA), 1996, 276: 704-709

Abstract:

The size, geographic distribution, and specialty mix of the United States physician workforce continue to interest North American health policy analysts. Evidence suggests that the United States is on the verge of a serious oversupply of physicians, particularly nongeneralist physicians. Canada faces some of the same problems in physician supply, cost and distribution as does the United States. Unlike the American States, however, the Canadian provinces, which are responsible for the financing of health care, have in recent years made changes in their physician workforce policies that address these problems. In particular, Canadian provinces have developed policies that limit medical school enrollment, adjust the specialty training mix towards a better agreement with needs and establish incentives towards physician practice location. This article proceeds on the assumption that historical and contemporary similarities between medical care systems in Canada and the United States make comparisons between them potentially valuable. It offers a historical perspective on the evolution of workforce planning in the 2 countries and identifies 3 periods of policy development. It also compares and contrasts the relative size and specialty composition of the Canadian and US workforces and discusses how Canadian initiatives have diverged from American policy. Unless the United States devises its own coordinated workforce strategy, it will have considerable difficulty in limiting physician workforce growth and in influencing specialization and distribution in the future.

Article: A semi-Markov model for primary health care manpower supply prediction

Authors: Trivedi, V., Moscovice, I., Bass, R., & Brooks, J.

Source: Management Science, 1987, 33(2): 149-160

Abstract:

The authors develop a semi-Markov formulation for modeling transitions of physicians, nurse practitioners, and physician assistants between different settings and locations within a geographic area. The model predicts the supply of primary care providers over a planning horizon. They compare the model predictions with estimates of future demand and the needs for primary care within a community. Statistical tests for validation and sensitivity analysis of the model establish the appropriateness of the semi-Markov approach. With the likelihood of an oversupply of physicians during this decade, the model offers a useful tool for objective decision making to health planners, administrators, legislators, and regulators.

Article: The SHARP way to plan health care services: A description of the system and some illustrative applications in nursing human resource planning

Authors: Denton, F. T., Gafni, A., & Spencer, B. G.

Source: Socio-Economic Planning Sciences, 1995, 29(2): 125-137

Abstract:

SHARP provides an analytical framework that brings together all major elements of the health care system and helps to organize the system *as a system*. (The acronym stands for System for Health Area Resource Planning; SHARP has been developed for Ontario, the largest of the Canadian provinces.) A framework for discussion is especially important during the current period of “health reform”, spurred largely by concerns to bring cost increases under control. The central message of this paper is that the planning process should be well informed and should take an integrated view of the health care system so that major future repercussions of actions taken today can be foreseen (albeit imperfectly). In reforming the system, it is important to anticipate both the requirements for health care services and the resources that are likely to be available to satisfy those requirements. The main features of SHARP are described and the system is illustrated with special reference to nurses and the services that they provide.

Title: Strengthening Nursing and Midwifery: A Global Study.

Authors: O’Brien-Pallas, L., Hirschfeld, M., Baumann, A., Shamian, J, Adams, O., Bajnok, I., Isaacs, E., Land, S., Salvage, J., Birch, S., Miller, T., Islam, A., Luba, M.

Source: Geneva: World Health Organization (WHO/HDP/NUR-MID/97.2).

Abstract:

The World Health Assembly approved resolution WHA45.5 in 1992. This resolution directed the Director-General of the World Health Organization to establish a Global Advisory Group for Nursing (GAG) to advise on the status of nursing and midwifery world-wide. Further, the Director-General wished the GAG to evaluate the state of nursing and midwifery services throughout the world relative to the implementation of the resolution and to monitor the extent of progress in implementation. In almost all countries of the world, nursing and midwifery services are the backbone of the health care system; the nurse or midwife is often the primary care giver. Yet while nurses and midwives have played a significant role in the delivery of services, they have not enjoyed the status or economic support to realize their full potential. In recent years economic, political, and social developments and changing health care needs have underlined the importance of strengthening nursing and midwifery. The eight key objectives for Member States proposed by the resolution included assessment of nursing/midwifery personnel needs and utilization, and the roles and functions of nurses and midwives; strengthening of nurses’ and midwives’ managerial and leadership capabilities; enactment of supportive legislation; strengthening of education; promotion of health services research; assurance of appropriate working conditions; allocation of adequate resources (financial, human, and logistic) for nursing and midwifery activities; and health policy reflecting the contributions of nursing and midwifery. This paper reports a study conducted to examine the extent to which countries have carried out activities aimed at implementing the resolution. A 37-item survey questionnaire, in eight sections structured around the eight elements of the resolution, was developed for the study. One hundred and fifty Member States responded, a 79% response rate.

Responses to each of the eight sections are described here in detail. The percentages of Member States responding “yes” to questions are presented by WHO region (six) and by (four) levels of economic development, according to the classification of the World Bank (1993). The study is an attempt to describe the state of nursing and midwifery services throughout the world. This report also provides a substantive description and baseline from which further in-depth country analyses can be planned. While the study data show progress at country level, far more action is needed to strengthen nursing and midwifery if these cost-effective resources are to play a decisive role in improving the coverage and quality of services to people, and especially the people in greatest need.