Original Article

Determining Hospital Workforce Requirements: A Case Study

Serpil Ozcan[1], Peter Hornby[2]

(1) World Bank Health Project, Ministry of Health, Ankara, Turkey and Centre for Health Planning and Management, Keele University, England

(2) Centre for Health Planning and Management, Keele University, England

Abstract

The difficulty of ensuring an adequate and appropriate distribution of health services, together with increasing financial pressures in the public sector, are forcing many countries to consider using more rigorous methods for determining staffing levels in the health facilities. The Workload Indicators of Staffing Need (WISN) method is one such method. It uses a form of activity analysis (activity standards), together with measures of utilisation and workload to determine staffing requirements. The method provides a vehicle for assessing localised staffing needs that is believable and which at the same time is sharply different to historic methods. This paper describes experiences in applying this method in hospitals in Turkey.lth manpower is to be optimized. Other issues related to autonomy are also discussed in varying detail.

Key words: *WISN, activity standards, workload, hospital staffing, Turkey.*

Introduction

Most countries, both in the developing and developed world, are experiencing the burden of increasing demand for health services and, associated with this, increasing costs in health care provision. As with most countries, Turkey, with limitations on funding of its public health service, must seek to meet these demands with new, more efficient and more radical approaches to health and health care provision. This must include a more effective use of its resources.

A critical resource is the health workforce itself, both because it consumes between 70% and 75% of the recurrent budget allocated to health and because it is the skills, capacity and commitment of this resource that will be a major determinant of efficiency and effectiveness in the delivery of health care.

The provision of health care is dependent on a complex array of social, political, economic, demographic and epidemiological factors. The requirements across the country for health services and the related staff who go with these services will vary and depend on variations in population density, age, sex and mortality; wealth and education; geographical features; utilisation patterns of health services; and the ease of access to these services.

Institutional staffing norms based solely on population or institutional size do not adequately take into consideration these variations of need within a country. This necessarily creates real problems in health service provision, not only through under- or over-provision of health service staff but also through the inappropriate allocation of different cadres of staff.

In the developing world there has been continued difficulty in ensuring an adequate and appropriate distribution of health service staff to deliver both preventive and curative health services equitably across a country. This

difficulty has been compounded by increasing financial pressures on public sector finances; difficulties in providing adequate resources and facilities to support the workforce; increasing public expectations of health care and the quality of health care; and, finally, an emerging middle class able to purchase private health care which, in many cases, is substantially superior to the care available through the public sector organisations.

Public sector health services are, as a consequence, experiencing new pressures to improve the quality, quantity and accessibility of the services they provide, while at the same time having to operate under tight financial constraints. Allied to these pressures is the need to change the roles that different cadres of staff discharge, emerging in part from new views of health professional roles, partly through a changing technology for health interventions and partly through a requirement for greater skills in the workforce to meet the growing expectation of the public.

To meet these pressures, many governments are introducing radical changes, including decentralisation of responsibility for health care and, increasingly, promotion of the private sector. Governments have, at the same time, to ensure increased value for the money they invest in public sector health services. This has led many countries to look at ways of improving the efficiency and effectiveness of the services they provide. This inevitably leads to a closer examination of the basis on which staff are distributed throughout the health service and how they can be used more efficiently and effectively in raising the health of the population as a whole.

One significant development in this has been increased attention to monitoring performance and efficiency in the constituent organisations of the health service[1]. There are increased efforts to ensure staff are fully utilised by introducing a new orientation to setting staffing standards for individual institutions. These new standards are intended to reflect both the type and volume of work undertaken by a particular institution.

In the existing system in Turkey, staffing requirements in health facilities are determined not by an assessment of needs or service utilisation and workload but rather on notional principles of population served and/or numbers of beds. These norms for staffing, however, are not generally used.

All the financial, organisational and operational dilemmas now facing most health systems, including that of Turkey, require a new approach to determining staffing requirements which is locality specific, objective based and not derived solely on national norms that are unrelated to local service needs, staff utilisation and workload.

Hospital services in Turkey are provided by the MOH, the Ministry of Defence (MOD), the Ministry of Labour and Social Security, some State Economic Enterprises, Universities and the Private Sector. Of the total of 1076 hospitals, 682 are run by the MOH. These provide 50.3% of the hospital beds in the country, with an overall occupancy rate of 55%[2].

As a part of the Human Resources (HR) Development Division's activities, within a World Bank supported Health Project of the Ministry of Health (MOH), the initial steps of a process for determining staffing norms for hospitals which meets these requirements was initiated in Turkey in 1995[3]. The overall intention of this development study was to move staff requirement assessment from an arbitrary and institution based approach to an interactive one in which the determination of staff requirements was based on utilisation and workload. The approach utilised is a method known as Workload Indicators of Staffing Needs (WISN).

The conceptual approach behind WISN was described as early as 1980[4]. Subsequently it was developed as an operational tool in 1984 by P.J. Shipp[5] to meet some specific requirements for a simple but rapid method for projecting staff requirements in Human Resources (HR) strategic

planning. Development of the method continued with pilot applications in a number of countries[6-7] and culminated with its adoption, publication and promotion by the World Health Organization[8].

This paper reports on experiences surrounding the use of this method in a number of MOH hospitals in Turkey. Hospitals were selected as the most appropriate institutions in which to test the WISN method initially. This was because service statistics were more reliable in hospitals; the tasks performed by different types of staff, while often complex, are better defined; and because hospitals employ the majority of health personnel in Turkey. It is where distributional problems of health staff can be most severe in their effects on service quality.

Methods

1. New Approaches to Determining Staffing Needs

As health service organisations began to emerge from the traditional approaches to determining staffing requirements, they increasingly adopted methods for determining staffing needs, which were based on some form of activity measurement[9]. The staffing norms that emerged are all intended to be specific for the type and location of staff being considered.

There are five main ways of accumulating the information (data) to make an analysis of activity. These are:

1. direct observation of staff activities;
2. self-monitoring using a log or a diary;
3. questionnaires;
4. interviewing relevant staff; and,
5. expert opinion.

Each method clearly has strengths and weaknesses, which relates to its precision, cost and time to complete. At one extreme is the direct observation method which is costly and time-consuming but ultimately the most precise of all the methods. At the other extreme is the use of questionnaires, which are relatively cheap and easy to administer requiring little time but dependent for accuracy on the quality of the questionnaire itself, as well as the response of those, completing the questionnaire.

All these methods have a place and it depends rather on the types of staff, political circumstances and the degree to which precision is needed to determine which method is adopted. In all situations, the results of an activity study need some degree of interpretation and interpolation by experienced and relevant staff if they are to be accepted by the workforce.

In the circumstances of this study in Turkey, limited finances, combined with limited experience or commitment to developing workload-based staffing requirements suggested that a method of relative simplicity, combined with reasonable precision and relatively low cost, would be the most appropriate method to adopt. The WISN approach, which uses **expert opinion,** meets these criteria and, while clearly not as accurate as direct observations, does provide a vehicle for assessing staffing needs that is believable and, at the same time, sharply different to historic methods.

The overall purpose of the study was to:

a. establish activity standards for the major personnel categories in the health service;

b. create a framework for determining workload based staffing requirements for all MOH general and teaching hospitals with the process repeated for the university hospitals to provide consistency in staffing standards for major hospital types; and,

c. integrate the results of the study into the processes for determining staffing needs in use by the general directorate of personnel.

2. Organizational Structure for the Study

The HR division of the World Bank project was commissioned to design and implement the study on behalf of the MOH. The core task force for this assignment consisted of a statistician, an economist, a medical technologist and a nurse.

Additionally, in order to provide top level support, a technical advisory committee was established. This committee consisted of the deputy director general of personnel, deputy director general of curative services, participants from medical schools, dean of a medical school, a public health specialist, a representative from the Turkish Medical Association, a representative from the State Planning Organisation, and the project coordinator and deputy project coordinator of the World Bank project.

This study necessarily had internal political implications in that it had the potential for changing well-established procedures inside the MOH. Consequently, all the activities undertaken by the task force were first discussed with the steering committee to gain both their technical input and political support for the activities and to ensure cooperation at the study sites.

3. Samples

3.1 Health facilities

As described earlier, the focus for the study was on three types of hospitals (general hospitals, teaching hospitals and university hospitals) and ten different staff categories. University hospitals are not under the direct control of MOH. However, they are in the forefront of exploring new ideas and, as they exhibit both similarities and differences with the MOH teaching hospitals, it was decided to include university hospitals in this study.

3.2 Categories of staff

The categories of staff selected for inclusion were specialists in internal medicine, gynaecology, pediatrics and general surgery, dentists, pharmacists[a], nurses (pediatric, emergency service, operating theatre, and polyclinic nurses and nurses working in other wards), midwives and laboratory and radiology technicians. These categories comprise 84.6 % of the total MOH health personnel working in health institutions[(10)].

4. Setting activity standards and standard workload

There are activities which determine the workload in every type of hospital such as the number of: surgical operations, inpatients treated, deliveries, laboratory tests, training sessions, and so on. It is possible to set an activity standard for each of these activities. An "activity standard" is the amount of time required by a well-trained and motivated staff member to perform a given task in the specific conditions of the country[(11)]. If the total number required of each type of activity (workload) in a facility is compared with activity standards of personnel discharging these activities, it leads directly to the determination of the number of personnel required by the facility.

The work of the task force, therefore, was to determine activity standards, available working time for each staff category, and volume of activity (workload), and produce results in a form that could be used for management decisions on future staffing.

Setting activity standards is central to implementing the WISN method. Activity standards need to be acceptable to health managers and health professionals; therefore, they should be set by experts who are experienced and authoritative in the service fields in question. Two types of groups may be used to set performance standards: cadre groups or facility groups. In cadre groups, members of a particular cadre, such as paediatricians or nurses, set the standards for members of that cadre in

[a] This paper does not include conclusions about dentist and pharmacist requirements as the work on these staff had not been finalised at the time of preparation of this paper.

each type of facility. In facility groups, members of a particular facility type (e.g. general hospital) set the standards for each cadre for that facility type[11].

This study adopted the cadre group approach as being the most acceptable to professionals at the time. Committees of experts in service provision, management and training were formed for each category of staff involved in the study. In addition, in order to reflect geographical differences in the country as well as balancing operational and academic views of care, participants from different provinces and different types of institutions (MOH hospitals and university hospitals attached to medical schools) were included in the committees. Where possible these included individuals from facilities which are generally known for "good practice".

At least two workshops were held by each cadre committee to determine: (a) working time per year for each staff category; (b) a list of key activities for different hospital service functions; and, (c) the activity standards (a unit of time to perform each activity). The activities considered included those routinely reported as service statistics (e.g. patient examination, surgical operations, etc.), as well as activities not included in those statistics (e.g. in service training, sterilising equipment, cleaning).

Results

1. Average annual working time

The project task force turned these activity standards (unit time for an activity, working rates or time allowances) into standard workloads (volume of work done by an individual in a year) by comparing available working time per year and the activity standards. Annual service statistics provided information on the volume of all the activities undertaken by each hospital and the actual numbers of staff undertaking these activities.

The average working time in a year was determined as the available working time, assuming a five-day, eight-hour a day working week, less the expected average non-working days in a year. Table 1 shows the calculation for nurses.

As Table 2 shows, there is sufficient variation between some categories of staff that the determination of average working time per year needs to be made on a staff category to staff category basis.

2. Activity Standards

Using the activity standards proposed by the expert cadre committees, calculated working time and service statistics, some sample calculations were made of staffing requirement to test how reasonable and attainable the activity standards were. The conclusions were then tested with the actual situation in three hospitals (two general hospitals and one teaching hospital) in three different provinces.

Table 1 Available annual working time for nurses

Non-Working Days per Year	
A. Annual leave	25 days
B. Sick leave	15 days
C. Holidays	12 days
D. Administrative leave	9 days
Total	**61 days**
Total Non-Working Weeks per Year = 61/5 = 12.2 weeks	
Working Time	
Working weeks = 52-12.2 = 39.8 weeks per year	
Working days = 39.8 x 5 = 199 days per year	
Working hours = 199 x 8 = 1,592 hours per year	

Table 2 Variations in average working time per year

Staff Type	Average Working Time/Year (Hours)	Varation (Percentage)
Specialist	1,704	0
Dentist	1,688	-0.9%
Nurse	1,592	-6.5%
Lab Technician	1,672	-1.9%
X-ray Technician	925	-45.7%

Staff recorded the activity times for each of their activities for a period of two weeks. These included those activities concerned with the provision of care and other activities relevant to the staff functions described earlier such as in-service training, cleaning and so on. For these ancillary activities, some form of time allowance was made. All the staff included in the study were given training in the basic concepts and procedures of WISN and how to complete the pro-forma recording forms that were used for data collection. These forms were designed around the list of activities determined by each expert committee for each category.

The data collected from three hospitals was analysed using a computerised analytic tool (Statistical Package for Social Sciences [SPSS] for Windows) and the results of the data analysis presented to the expert committees for review and finalisation of the standards.

Table 3 shows the results for activity standards for ward nurses in all types of hospitals. It includes a recognition that patients with different dependencies need differing amounts of time allocated. As information on the implications of patient dependency on staff time was not known, expert opinion was used to provide reasonable assumptions. In this study, three dependency levels were used. Some assessments use five dependency levels[9].

Some examples of activity standards for other types of nursing care are shown in Table 4. The overall requirements for nurses is built up from the requirements for each of the array of activities that nurses undertake.

The presence or absence of other staff categories can have a significant impact on the nature of workload. Table 5 compares standard workloads for paediatricians working in general hospitals and teaching hospitals. In the case of the teaching hospital, the presence of medical staff in training alters both the patient contact time and the nature of the specialists' workload.

3. Staffing Requirements

A simple computerised model was also developed on a computer spreadsheet program to automate the determination of standard workloads and staffing requirements for different types of facilities.

Table 3 Ward nurse activity standards

Activity	Activity Standard	Standard Workload	Allowance
1. Direct Patient Care			
a. Dependent patients	9.67 hrs/patient/day	165 patients/yr	-
b. Semi-dependent patients	3.47 hrs/patient/day	459 patients/yr	-
c. Independent patients	1.01 hrs/patient/day	1576 patienst/yr	-
2. Death care	10 minutes/death	9552 patients/yr	
3. Care management	1 hr/day	-	12.5%
4. Cleaning & sterilising equip.	10 minutes/day	-	2.1%
5. In-service training + research	2 hrs/week	-	5%
6. Misc. activities not related to nursing	1 nurse 3 hrs/day/ward	-	37.5%/ward
7. Other (personal)	1 hr/day	-	2.5%

Table 4 Selected direct patient care activity standards for other nursing activities

Activity	Activity Standard	Standard Workload	Allowance
1. Polyclinic (Outpatient)	8 min/patient	11940 patients/yr	-
Patient training & consultancy	1 hr/day		12.5%
2. Emergency care unit			
a. Minor case	17 min/patient	5619 patients/yr	-
b. Medium case	43 min/patient	2221 patients/yr	-
c. Major case	138 min/patient	692 patients/yr	-
3. Operating theatre			
a. Scrub nurse			
Major operation	125 min/patient	764 patients/yr	-
Medium operation	55 min/patient	1737 patients/yr	-
Minor operation	55 min/patient	1737 patients/yr	-
b. Circulating nurse			
Major operation	143 min/patient	668 patients/yr	-
Medium operation	73 min/patient	1308 patients/yr	-
Minor operation	73 min/patient	1308 patients/yr	-
4. Paediatric nurse			
a. Dependent patient	15.71 hrs/patient	101 patients/yr	-
b. Semi-dependent patient	7.43 hrs/patient	214 patients/yr	-
c. Independent patient	2.14 hrs/patient	744 patients/yr	-
d. Prep. for nutrition	20 min/day	-	4.2%

Table 5 Activity standards for paediatricians in general and teaching hospitals

Activity	General Hospital Standard Workload	General Hospital Allowance	Teaching Hospital Standard Workload	Teaching Hospital Allowance
1. Outpatient Exam	6816 patients/yr	-	6816 patients/yr	-
2. Wards				
a. Visit	10224 patients/yr	-	6816 patients/yr	-
b. Recording+admiss.	2556 patients/yr	-	-	-
c. Discharg. Proced.	5112 patients/yr	-	7865 patients/yr	-
d. Medical interven.	6816 patients/yr	-	34080 patients/yr	-
3. Training	-	10%		
a. Asst. training			-	12.5%
b. Training other staff			-	3.75%
c. Prep. for clin. meet			-	2.5%
d. Atten. clin. meet.				10.0%
e. Planning & eval.				0.63%
4. Research			-	20%
5. Admin. Activ. (1 per.)	-	1.25%	-	1.9%
6. Informing pat's rel's & telephone	-	6.25%	-	7.3%
7. Mobile consultation	-	6.25%	-	6.3%
8. Other (personal)	-	6.25%	-	6.3%

The following formula was used to determine the staffing requirement[11]:

Total personnel requirement = ([Intermediate - total personnel requirement] x Category allowance factor +[Total individual allowance])

Where;

Intermediate-total personnel requirement = Total annual workload/standard workload

Standard workload = Total available working time per year/Activity standard

Category allowance factor =1/1-(Total Category Allowance)

There exist two different types of activity allowances. These are known as **individual allowance** and **category allowance**[11]. Category allowance refers to those which apply to all staff in a particular category, e.g. all nurses meeting for five hours in a month. Individual allowance refers to those which apply to a fixed number of staff in a particular category, e.g. one nurse undertakes administrative work which occupies her for 30 minutes per day.

Discussion: Using the Results

The WISN method of determining institutional staff requirements based on the amount and type of work that the institution undertakes has the potential to reduce costs. It does so by quantifying what staff are needed and how many to undertake the likely workload. To do this, it relies on the use of historical data (the previous year's workload) to project what the coming year's workload will be. This reliance on historical data is a potential weakness of the method, although it is unusual for workload to change dramatically on a year to year basis. Nevertheless, it does require that workload is reassessed on a year to year basis.

The impact of the WISN method can be well demonstrated through the results of the study applied to two fifty-bed hospitals in the Turkish health system. They are located in different parts of the country with Hospital A relatively isolated and Hospital B close to a large conurbation with other hospitals available to the population it serves. The workload in Hospital B is much lower than in Hospital A. The outcome in terms of staffing requirements for the categories in this study is shown in Table 6.

Table 6 Comparison of staffing requirement for two fifty-bed hospitals

Staff Category	Hospital A Requirement	Hospital B Requirement
Paediatrician	2	1
Gynaecologist	6	2
Internal medicine	3	1
General surgery	2	2
Nurse	116	61
Midwife	17	5
Laboratory technician	8	6
X-ray technician	2	1
Total	156	79

Comparisons between actual staffing and required staffing, either as a difference between the two or as a ratio of actual staff to required staff (the WISN ratio) provide a useful mechanism for assessing priorities to address staff overloads or staff under-utilisation. If the WISN ratio is 1, then there is a perfect match between requirement and the actual staffing; if it is greater than 1, there is a staff surplus; and if it is less than one, there is a staff shortage.

As Table 7 shows, gynaecologists have the highest workload pressure (overload), followed by internal medicine specialists and nurses, while there is a serious over-staffing of x-ray

technicians. This points to these three categories as being a priority in the new personnel assignments for Hospital A, although there is a potential to explore more integration between midwives and nurses. Overall the workload pressure on the hospital as a whole is slightly greater than 1 which suggests overall a reasonable match between workload and staffing but with areas of disproportionate workload.

Hospital B, which is similar in size to Hospital A, has a low annual workload. But, as Table 8 shows, it also has an acute staff shortage which is demonstrated by the WISN ratios. Failure to address staffing problems here will almost certainly lead to a continuing drop in utilisation of its facilities.

These WISN calculations provide a clear and understandable presentation of the existence of workforce problems (staff surplus, staff shortage, distribution, and allocation) as well as how severe they are. It is possible to identify which staff categories are under pressure to cope with the existing workload.

These types of staffing analysis results can also be used to compare two or three hospitals to establish equitable staff allocations among them. However, at least in the case of hospitals, the use of the WISN method is seen to be at its most effective when it is used for local rather than more centralised decision making.

Conclusions and Recommendations

There are many different methods for undertaking an activity analysis, each with varying degrees of accuracy and cost. The WISN method deliberately sets out to simplify the process. Necessarily, this results in the loss of some accuracy in describing and detailing the activities. Nevertheless, the relative simplicity

Table 7 Staffing analysis for hospital A (50 beds)

Personnel Category	Actual staff	Requirement	Difference	WISN Ratio
Paediatrician	3	2	1	1.5
Gynaecologist	3	6	-3	0.5
Internal medicine	2	3	-1	0.67
General surgery	2	2	0	1
Nurse	101	116	-15	0.87
Midwife	31	17	14	1.82
Laboratory technician	13	8	5	1.63
X-ray technician	7	2	5	3.5
Total	162	156	6	1.04

Table 8 Staffing analysis for hospital B (50 beds)

Personnel Category	Current staff	Requirement	Difference	WISN Ratio
Paediatrician	1	1	0	1
Gynaecologist	1	2	-1	0.5
Internal medicine	1	1	0	1
General surgery	1	2	-1	0.5
Nurse	10	61	-51	0.16
Midwife	4	5	-1	0.8
Laboratory technician	3	6	-3	0.5
X-ray technician	3	1	2	3
Total	24	79	-55	0.30

of the WISN method makes it both appealing and understandable to those who must make judgements based on a WISN assessment.

Despite its relative simplicity, the WISN method can appear complex to the untrained eye. There is, therefore, a need to train a core of people who are proficient in the WISN methodology and able to make the necessary calculations to determine local staff requirements. At the same time, managers in the health system need some training to understand how the techniques and technology of WISN can be used by them to improve their management decision making.

Setting activity standards that are attainable and reasonable is not easy. Almost invariably, the expert committees initially set standards too high requiring, as a result, a lengthy review process to reach agreement on the standards. This is not necessarily undesirably because this process, over time, helps in reaching a consensus of understanding about the core functions of particular staff categories.

Equally difficult for the expert committees was the need to bring the multitude of minor activities into composite groups of five to six major activities. Initially, committees felt every activity of whatever kind had to be listed separately. It was only through presenting an exhaustive list of activities that committees began to see the need to assemble groups of activities into major components of total activity to facilitate the determination of activity standards.

Care needs to be taken in assessing the workload in a facility. Lack of resources other than human resources at a particular time can give a misleading impression of potential workload. In these circumstances, corrections need to be made to the staff requirements to accommodate the likely workload situation as the overall availability of resources changes.

This pilot study has been particularly successful in uncovering substantial amounts of new information about the workforce which was not previously available. This information is currently being used in further planning activities for privatisation of several state hospitals.

The WISN method is intended for application in any type of health institution. However, the multiplicity of specialties and complex interactions in tertiary institutions makes the application of the WISN method cumbersome and ultimately less believable. It is in the smaller hospitals at district and, in some cases, regional level with fewer complex processes that the WISN method provides an efficient and rapid assessment method.

It is true that the WISN method could be applied to sub-elements of a tertiary hospital such as wards. However, there are other approaches to determining ward staffing which may be more accurate and just as acceptable with more flexibility in their use.

Ultimately, the pilot study was aimed at introducing the WISN methodology into existing procedures in use in the general directorate of personnel in the MOH for determining staffing. In the short term, at least, this aim has not been realised. In part, this is because of conflicting bureaucratic processes within the MOH and in part because of a continued centralising orientation and finally, in part, because there is not yet a critical mass of senior decision makers in the MOH willing to engage with the issue of greater efficiency in the use of human resources.

The pilot study, with its workshops and field testing, has led to significant numbers of health service staff becoming aware of a new way of determining local staffing requirements. It appears to have had some effect on their thinking in terms of the roles, activities and management of services in their institutions.

The experience of this pilot study has emphasised that local participation is essential for an effective and successful use of the WISN method. It appears ideal for hospitals providing secondary care in a decentralised health service and, indeed, any institution (primary of secondary) with relatively simple operating structures. It would be desirable to include a

requirement for workload based staffing determinations as part of decentralisation policy. As in all changes of this nature, the sensitisation of senior officials and the training of a core of staff in the application of the method is an essential pre-requisite to the successful use of WISN.

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