

Original Article

Guiding Policy Through Workload Indicators: A Study of Three Orthopaedic Units

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Abstract

Objective: To estimate staffing and resource requirements in Pakistan for orthopaedic units of three allied hospitals in Rawalpindi, a major city, using Workload Indicators of Staffing Needs (WISN). To identify inequitable resource distribution and consequently implement and audit improvements. To recheck the changes made after a period of two years in the same three orthopaedic units.

Methods: Human resources and workload across the orthopaedic units of three tertiary care hospitals in Rawalpindi in 2021 were assessed. Anonymous institutional data was analyzed using WHO's WISN methodology. Metrics included:

- Staffing levels (specialists)
- Workload (surgeries, admissions, outpatient, teaching hours).
- WISN calculations: Standard Workload, Work in Facility, and Staffing Requirements.

These calculations were used to identify the deficits or surpluses of human resources in the three hospitals. Based on this data, we attempted to adjust the staff within the three hospitals. These adjustments were limited because of various constraints in public hospitals.

Similar data were collected again in 2023, and any change [positive or negative] between 2021 and 2023 was assessed using the same parameters.

Results: In the year 2021, the total number of patients treated in all orthopaedic units was 104760, with Hospital A managing 11.4%, Hospital B 67%, and Hospital C 21.6% of the patient load. The number of specialists in Hospitals A, B, and C was 8, 8, and 2, respectively.

WISN Scores:

- Hospital A: 3.64 (overstaffed, 5 surplus specialists).
- Hospital B: 0.99 (optimal staffing).
- Hospital C: 0.65 (35% deficit; requires +2 specialists).

In the year 2023, the total number of patients treated in all orthopaedic units was 93908, with Hospital A managing 12% of the patient load, Hospital B 67%, and Hospital C 21%. The number of specialists in Hospitals A, B, and C was 5, 6, and 4, respectively.

WISN Scores:

- Hospital A: 2 (overstaffed; 3 surplus specialists).
- Hospital B: 0.77 (understaffed; requires +2 specialists).
- Hospital C: 1.3 (1 surplus specialist).

Conclusion: WISN effectively highlighted staffing imbalances in 2021, with Hospital C grossly understaffed and Hospital A heavily overstaffed. The reallocation of surplus staff based on figures forthcoming from this study improved equity in 2023; however, Hospital B's emerging deficits underscore the need for dynamic workforce planning. WISN has proven to be an effective tool for policymakers in evidence-based resource allocation in public health systems.

Keywords: Workload, Orthopaedic Units, Staffing Needs.

Introduction

Health service administrators worldwide are facing challenges owing to insufficient resources and growing demands.¹ If this is coupled with an inappropriate distribution of available resources, whether of manpower or of other facilities, the situation assumes greater seriousness. Developing countries with higher population growth and a paucity of resources are often the most affected.²

The workforce or human resources in health facilities, that is, doctors, nurses, and paramedical staff, play a pivotal role in the provision of health care. It also accounts for the largest share of health sector expenditures.³ Over the years, many stratagems and tools have been devised and deployed to estimate appropriate staffing needs. Numbers have been generated using parameters such as the widely accepted proportion of desired health workers to population and the practical implementation of this into the health force-to-bed ratio. These have been appropriate in the broader context. However, within the larger national canvas, it is seen that the regional, urban, and rural divides, along with devised primary, secondary, and tertiary tiers of health delivery systems, all have particular levels of demands, even within similar installed capacity, that is, the number of beds and operating theatres. To achieve desirable health care goals, human resource planning must be appropriate to the requirements of the particular sector.

The main aim of human resource planning (HRP) is to estimate and predict the number and types of human resources needed to achieve the objectives and goals of an organisation. It has been seen that neglect of Human Resource Planning can lead not only to such problems as unequal distribution of workforce, severe shortage

Contributions:

OUR - Conception, Design
AW MH¹ MH² YH SR - Acquisition, Analysis, Interpretation
OUR AW - Drafting
MH¹MH² YH SR - Critical Review

All authors approved the final version to be published & agreed to be accountable for all aspects of the work.

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of staff in rural or deprived regions on one end, but on the other end may pave the way for deployment of inappropriate staff or over deployment leading to nonproductive employees.⁴⁻⁷

In the late 1990s, the World Health Organization (WHO), in an effort to improve the health delivery system, developed a logical evidence-based system based on industrial models. This takes into account the work activities and time-based demands of the routine tasks/jobs performed by health staffers. Based on these workload indicators, appropriate staffing needs can be assessed. This method, the Workload Indicators of Staffing Need (WISN),^{8,9} has been applied in developing and developed countries globally. Encouraging results have been published in the past two decades endorsing the effectiveness of this concept.³ Use of this workload indicator is generally advocated for the development of a new, effective, and viable workforce norm.

Three allied public hospitals in a major city provide tertiary healthcare facilities to a large proportion of the population in northern Punjab and Kashmir, and are under constant pressure. In this article, we assess the workload of orthopaedic units and relevant human resources in these three hospitals and analyse the possibilities of optimising human resource planning by applying workload index systems for nursing. Follow-up after the partial implementation of recommendations is also presented.

Materials And Methods

A plan-do-study-act (PDSA) model was used to assess the human resources and workload contributions of these three units using service statistics and official hospital records for the years 2021 and 2023. Figure 1.

The combined bed strength of Orthopaedic units of the three hospitals, designated as A, B, and C resp. is 97, with 15 beds in A, 57 beds in B, and 27 in C. The human resource data chosen for doctors included the number of specialists working in each department. In 2021, there were 8 Orthopaedic specialists/consultants working in Hospital A, 8 in B, and 2 in C. In 2023, after some reallocation, the number of specialists stood at 5, 6, and 4 in the respective hospitals.

The workload data of the specialists looked at the total number of patients seen in outpatient departments, patients admitted in Orthopaedic wards of the hospitals, and surgeries performed in the relevant year. The teaching load, both of students and postgraduate trainees, was also recorded.

Calculations: For WISN calculations, the following steps were followed.

The Standard Workload: The standard workload was obtained from the WISN guidelines and the WHO criteria. It was noted that specialists and consultants (category A) working 6 hours a day have a standard workload of 1488 working hours per consultant per year (after excluding the officially allowed vacation and holidays in a year).

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Work in the Facility

Work in the facility of the specialists was calculated by adding the surgery time, OPD time, and round time for admitted patients according to the World Health Organization (WHO) criterion. For orthopaedic surgery, the standard time frame given by the WHO is 120 min for each major surgery, 4 min per patient in OPD, and 5 min per ward round per patient for admitted patients. We assumed an average of three visits per patient by a specialist for an admitted patient; that is, 15 min visiting time per admitted patient. Additionally, 300 h for students' training and 75 h for postgraduate trainees per annum were added to the sum as proposed by the WHO criterion. The time spent on attending to emergency patients was not included in our calculation to offset the contribution of non-specialist medical doctors in the emergency room.

Staffing Requirement

Staffing requirement was calculated by dividing the total 'Work in facility' by the 'Standard workload' per specialist.

Staffing Requirement = Work in Facility / Standard Workload per Specialist

Workload Indicators of Staffing Requirements: WISN

Finally, WISN was calculated by dividing the actual number of specialist staff by the calculated staffing requirement.

WISN = Actual Number of Specialist Staff / Staffing Requirement.

Results

The total number of patients treated in all three orthopaedic units in 2021 was 104760, with Hospital A managing 11.4% of the patient load, Hospital B 67%, and Hospital C 21.6%. The availability of specialists among Hospitals A, B, and C was 44%, 44%, and 12%, respectively.

In 2023, the total number of patients treated in all orthopaedic units was 93,908. Hospital A managed 12% of the patient load, Hospital B 67%, and Hospital C 21 % of the patient load. The revised distribution of the specialists was now 33%, 40%, and 27%.

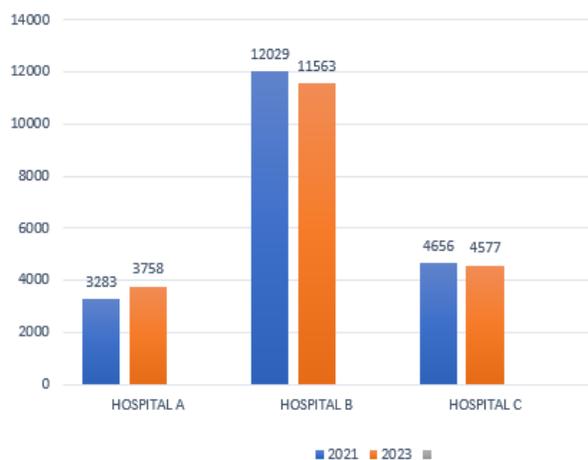


Figure 1: Total Work in Facility [in Hours] in Three Hospitals, 2021 and 2023

Work in facility hours of all orthopaedic specialists in 2021 totaled 19968, 16.4% of which were logged in Hospital A, 60.2% in Hospital B, and 23.4% in Hospital C. These work hours were analysed for each specialist in each hospital. Results show 410 work hours per specialist in Hospital A, 1504 hours per specialist in Hospital B, and 2328 hours per specialist in Hospital C. Details of work in the facility in 2021 are shown in Table 1

Work in facility hours in 2023 of the Orthopaedic specialists were calculated to be 3758 hours in Hospital A, 11563 hours in Hospital B, and 4577 hours in Hospital C. On analysis, work hours per specialist were 752 hours per specialist in Hospital A, 1927 hours per specialist in Hospital B, and 1144 hours per specialist in Hospital C.

Figure 1 depicts the total work hours of specialists in all facilities for both years, and Figure 2 graphically represents the work hours per specialist in each hospital. The Workload Indicator of Staffing Needs (WISN) in 2021 for the Orthopaedic Unit of Hospital A was 3.64, for Hospital B, it was 0.99, and for Hospital C, WISN was 0.65. Workload Indicator of Staffing Needs (WISN) in 2023 of the Orthopaedics Unit of Hospital A was calculated to be 2.0, Hospital B was 0.77, and Hospital C was 1.3. WISN for the two years is presented in Figure 3.

Table 1: Documentation of Orthopaedic Work in the facilities of three hospitals, 2021

Work In The Facility	A Hours per Annum	B Hours per Annum	C Hours per Annum
Ward Patients	120	504	221
Surgery	1920	5760	2380
OPD Patients	868	5390	1680
Student Teaching	300	300	300
Postgraduate Training	75	75	75
Total Hours	3283	12029	4656

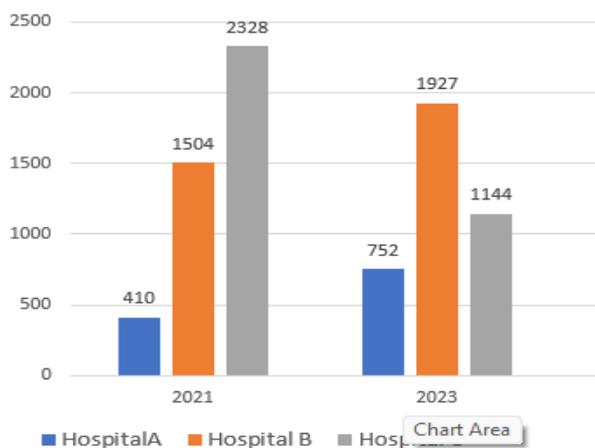


Figure 2. Working hours of a Specialist per year in Three Hospitals

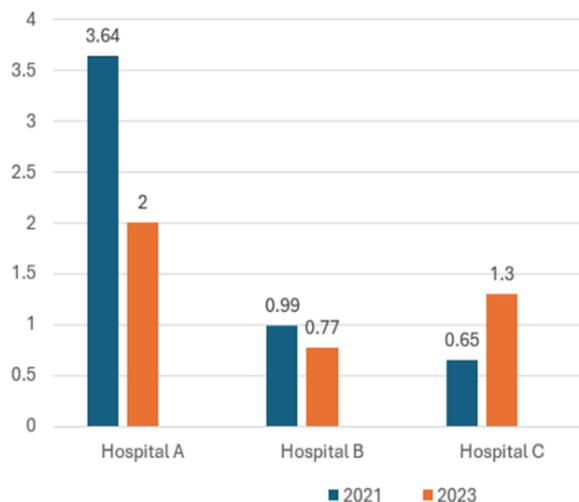


Figure 3: WISN of three hospitals in 2021 and 2023 [Ideally, WISN should be 1]

Discussion

Ideally, the work hours for a specialist Orthopaedic surgeon, as per WHO standards, are 1488 hours per year. These guidelines promote the optimisation of the level of health care provided to the public and safeguard the capacity and well-being of the care provider.

The Workload Indicators of Staffing Needs (WISN) index was developed to correlate two parameters: the number of staff available and the workload in hours in the facility. Under ideal conditions, WISN should be near one, indicating that the staff present is in accordance with the workload in the facility.

Our study revealed that in 2021, the eight specialists assigned to Hospital A, with an orthopaedic bed strength of 15, were working only 28% of the WHO standard working hours. WISN recorded a marked surplus of 3.6 times the staff required. Consequently, with the reduction of three staff members in 2023, the work performed per specialist increased, it remained to 50.5% of the standard working hours, indicating that it was still overstaffed to the level of twice the number of specialists required. Further reduction in the number of specialists is indicated by these figures. In Hospital B, which had 57 orthopaedic beds and eight assigned specialists, the working conditions were near ideal recommended conditions (1504 hours/year) in the year 2021. In 2023, the number of specialists was reduced to six, and work hours per specialist recorded 28% increase. The WISN index decreased, pointing to a deficiency in staffing requirements of 23%.

In 2021, only two specialists were posted in hospital C, orthopaedic ward bed strength of 27, and were working an extra 56% of the standard hours, clearly understaffed with a WISN score of 0.65. Following the addition of two specialists in 2023, the working hours per specialist decreased considerably, and their work in facility hours fell. WISN calculations revealed 30% overstaffing.

Thus, working with WISN, it was possible to clearly define the staffing positions in the three hospitals. Graph 3.

The concept of WISN has been pursued in Pakistan earlier, and a few studies have been published regarding the application of WISN.

Kayani et al. (10,10,11 in 2014 undertook a detailed survey of the workload and staffing requirements of Lady Health Workers (LHWs) of Kanpur UC, Khyber Pakhtunkhwa, using the WISN approach. They reported relative overstaffing of the facility with a WISN of 1.19 and observed that there was potential to increase household enrolment and patient outreach with existing strengths, and no further recruitment of staff was indicated.

In 2016, Ballo et al. 12, 13 studied nursing staff woes working in inpatient departments of the Federal Government Hospital in Islamabad. Their study revealed an overall WISN of 0.47, a workload pressure of 53%, and a shortfall of 25 nurses was identified.

Similarly, a survey conducted in 2018 of all tertiary care hospitals in KPK using the WISN methodology revealed an overall surplus of over 2000 doctors in medical, surgical, and allied specialties in these hospitals and an acute shortage of 565 emergency department doctors. 13 This study focused on the disaster response capability of the provincial tertiary health care system, where most disaster surges are diverted. Based on WISN-generated numbers, they concluded that KPK can manage an additional surge of 6.3% patients but falls short of the recommended $\geq 20\%$ surge capacity for adequate disaster response. They further observed that the lack of nursing staff, more than doctors, was the major reason for the lack of HR surge capacity in the tertiary health care system.

In the field of orthopaedics, Machado et al. (14 very recently employed the WISN approach to analyse the allocation of subspecialist orthopaedic doctors in a highly complex hospital. They calculated WISN ratios of 1.0 and 1.22 for hand care and spinal care units, respectively, indicating enough doctors in these groups. However, in the knee unit, the WISN was 1.69, indicating excess staffing. They concluded that these calculations were useful in orienting the design of health services to increase effectiveness.

Doosty et al. 3 conducted a scoping review of 31 published studies performed in 13 countries in Africa, Asia, and the Americas. They concluded that WISN can be applied to any healthcare organisation. It can readily identify a shortage of staff, calculate the required human resources for future models, and add inputs into budget estimates. This was the basis for our study to predict the required workforce in our hospitals. 15,16

WISN is based on actual workload; thus, it is a more objective and practical approach. 17,18 WISN can be employed at all levels of all health services, that is, from nursing staff to specialist doctors. It has tailor-made and customised specifications for health professionals of all specialties. 19-21

WISN has simplified things for healthcare managers, as it is easily understandable, even for those with little specialised information. 22,23

This study has certain limitations. As a single-center analysis, the findings may not be generalisable to other orthopaedic units with different patient loads and service profiles. The WISN methodology relies on routinely recorded service statistics and expert-derived activity standards, which may be subject to documentation bias and variability in case complexity. Additionally, academic, research, and administrative responsibilities were not fully quantified, potentially underestimating actual staffing requirements.

Conclusions

The use of Workload Indicators of Staffing Needs (WISN) clearly highlighted the fault lines in manpower allocations in the orthopaedics department of the three public hospitals in the city, successfully provided guidelines to improve the situation, and emphasised the need for ongoing vigilance. WISN has proven to be a handy and time-tested tool for managers, administrators, and those dealing with manpower distribution. Carrying out similar studies on workload demands of other medical and paramedical personnel in different disciplines of medical institutes will help in identifying the overburdened departments on one hand, and on the other hand will indicate the places with surplus staff. Staff balancing according to workload will improve the working environment, quality, and efficiency of units.

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