

THE RESOURCES UTILIZATION PATTERN IN A GENERAL UNIVERSITY HOSPITAL

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Abstract. University hospitals provide the highest level of medical care available for less frequent and very complicated conditions and instances of last referral care. The largest share of national health expenditure gets for hospitals, regardless of the health status and income level of a population. Within the hospital sector, the university hospitals after a negotiation of their budget with insurance houses generally get a big part of the available financial resources. In addition, a significant part of the other essential health sector resources like human, physical or technological are usually concentrated in these hospitals. The goal of the present study was to assess the supply of specialized services in a university hospital based on utilization pattern of existing resources. The concept of allocative efficiency has been used. Analysis was based on indicators, which are relevant for hospital activity: average hospital stay, bed turnover rate, occupancy rate, hospital mortality.

Key words: university hospital, utilization pattern, average hospital stay, bed turnover rate, occupancy rate, hospital mortality rate

Rezumat. Spitalele universitare oferă îngrijiri de nivel calitativ maxim pentru cazurile complexe specifice ultimului nivel de referință. Cea mai mare parte a fondurilor pentru sănătate revine spitalelor, indiferent de profilul de morbiditate și de nivelul de dezvoltare a țării. Dintre spitale, cele universitare obțin prin negocieri cu casele de asigurări o mare parte din resursele financiare existente. În plus, o proporție considerabilă din resursele umane, fizice sau tehnologice ale sectorului sanitar, sunt concentrate în aceste spitale. Scopul studiului de față este de a evalua oferta de servicii a unui spital universitar cu ajutorul modelului de utilizare a resurselor existente. A fost utilizat și analizat conceptul de eficiență alocativă. Analiza se bazează pe indicatori relevanți pentru activitatea spitalului: durată medie de spitalizare, rulajul paturilor, rate de ocupare, mortalitatea spitalicească.

Cuvinte cheie: spital universitar, model de utilizare, durată medie de spitalizare, rulajul paturilor, rată de ocupare, mortalitate spitalicească

INTRODUCTION

Hospitals exist to serve their communities and meet their needs in conjunction with local health and community-based services.

The history of this important part of the present-days health system is ancient and interesting in the same

time, the first recorded hospitals arising in the Byzantine Empire in the 5th century AD. Hospitals in Europe emerged later, beginning in the monasteries, a legacy reflected in the religious designations of many present-day european hospitals (1,2). The rapid growth of cities especially

due to industrial development had many social changes with consequences upon health and health care. Philanthropic or self-interested wealthy people have built new hospitals, especially in highly developed regions.

Hospitals are classified according to the average length of stay, the type of ownership, the focus of care, functions and levels of technology (3). Taking into account the last criterion, we distinguish three types of hospitals (fig. 1).

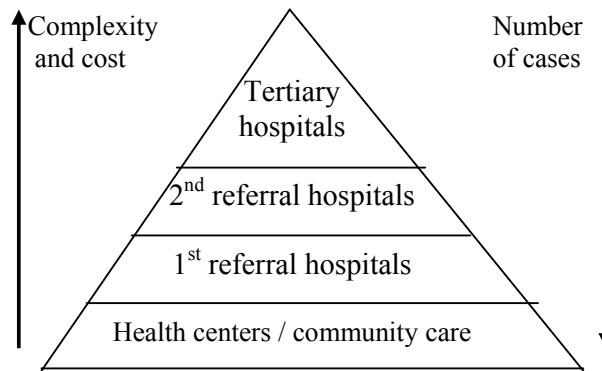


Fig. 1. Model of hierarchical hospital referral system

The first referral hospital provides intramural medical care of a level or complexity beyond that feasible by ambulatory care in the particular geographical area, district or region and receives the majority of referrals from ambulatory services (4).

The secondary referral provides complex multispecialist intra and extramural care and serves as backstop for the first referral hospitals in the hierarchy of technical competence.

The last referral hospital or tertiary hospital provides the highest level of medical care available in the country or region. Typically, this category would include university teaching hospitals, public or private medical centers of excellence and hospitals from big cities (5,6).

In assessing the supply of hospital services we must keep in mind the six dimensions of quality in health care: accessibility, equity, appropriateness, acceptability, efficiency and effectiveness (7).

Then, it is important to establish what needs exist and where they are not meet. This is a continuous process, since epidemiological, demographic and economic changes may cause unforeseen changes to the pattern of need and demand.

Top management must be involved in determining the best configuration of service, matching it to resource availability (of staff, equipment and money), consulting interested parties, submitting plans to higher levels for

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publishing them and programming the implementation of agreed plans.

PURPOSE OF STUDY

Hospital care in Romania is in a transition phase. Key elements of this process of change are the concepts of flexibility and decentralization to achieve health care delivery at maximum efficiency and efficacy, while still maintaining the social values of equality and equity.

A process of subsidiarity characterize this process of change, i.e. do not let higher health care levels do what can be done by the general practitioner or by hospitals of first referral (8).

In conditions of increasing health care costs and reduced rate of economic growth, hospitals are the main spenders within the health system. In the same time, hospitals provide complex curative care, academic hospitals being centers for the transfer of knowledge and skills and constituting an essential source of information and power.

The present study is focused on assessing the supply of specialized services in "C. I. Parhon" University Hospital from Iași city. This is a public general hospital associated to University of Medicine and Pharmacy and has a major role in the undergraduate and specialist teaching and training of personnel in a range of medical and surgical specialties.

As any other last referral hospital, its catchments area is not only Iași city surroundings, but also all eight districts of North-Eastern Romania.

The hospital signed a negotiated contract with Insurance House of Iași to provide hospital services at reasonable costs for the insured population. In addition, due to protocol between the Ministries of Health and Education, academic staff is pays for teaching activity by University of Medicine and Pharmacy and for hospital activity by Ministry of Health and Family.

The assessment of hospital performance is very useful, indicating how the activity and employment of resources are justified, as far as possible of allocated budget.

MATERIALS AND METHODS

During 2000 – 2001, the utilization of university hospital resources has been assessed. The analysis was performed on departments. For the year 2000 the available data from sanitary statistics allowed a comparison with district and national level. Medical records from the hospital statistics department have been processed on EXCEL and SPSS10 software.

Following indicators have been used for analysis:

- hospital admissions per 100 ambulatory consultations (9);
- average hospital stay (AHS);
- bed turnover rate;
- occupancy rate;
- hospital mortality.

The pattern of hospital utilization was analyzed in the context of a tertiary hospital, as is shown in table 1.

Table 1. Optimal pattern of hospital utilization

Hospital type	Average length of stay	Turnover rate
1 st referral	Lower	Higher
2 nd referral	Middle	Middle
Tertiary	Higher	Lower

Bed turnover rate represents a measure of productivity and occupancy rate for a defined period of time (one year) and it is a measure of capacity utilization.

Following formulae depicts the relation between occupancy rate, bed turnover rate and AHS:

$$\text{Occupancy rate} = \frac{\text{AHS} \times \text{Turnover rate}}{365}$$

A more accurate interpretation of these indicators requires using them together. These three indicators are mathematically related, so that the knowledge of any two of them enable the third to be calculated.

The assessed indicators allow establishing the level of allocative efficiency as a determinant of performance for a hospital. From this point of view, due to the increased number of referrals from primary health care facilities, the basic characteristic for hospitals of first contact is a lower average hospital stay and a higher bed turnover rate. In majority, the cases admitted at this level are simple to diagnose and treat, contrasting with high complex cases of tertiary hospitals.

Regardless the level of referral, the optimal hospital utilization implies a high occupancy rate.

RESULTS AND DISCUSSION

The university hospital from Iași city provides a defined range and volume of medical care throughout following departments: internal medicine, nephrology, surgery, urology and intensive care. These departments are situated in the same 6th floor building, with a total number of 255 beds. In literature, the best results have been observed at a low level of around 300 beds (an optimal size ranges from 200 to 400 beds), with maximum efficiency, over 650 beds being registered diseconomies (10).

The total number of admissions was 7434 in year 2000, and respectively 7147 in 2001. Hospital admissions per 100 ambulatory consultations decreased from 42.36% in 2000 to 36.13% in 2001, the total number of ambulatory consultations being 17549 in 2000 and 19781 in 2001. The urology department had the highest rate of ambulatory consultations as is shown in figure 2 (44%).

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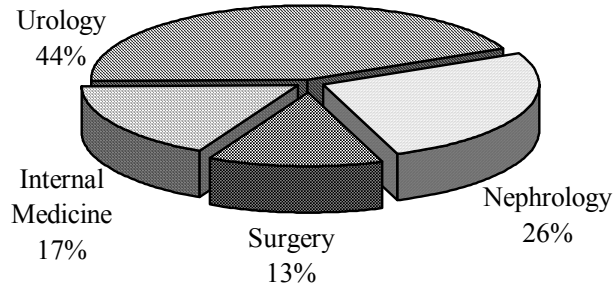


Fig. 2. The distribution of ambulatory consultations by departments in year 2000

It is important to specify that in this university hospital we found the unique departments of urology and nephrology of tertiary level from Iași city and Moldova region, some patients admitted there being referred from other districts.

All departments had a higher number of admissions in 2001 versus 2000, excepting intensive care and surgery (fig. 3). The last one recorded a decreasing from 820 patients in 2000 to 194 in 2001.

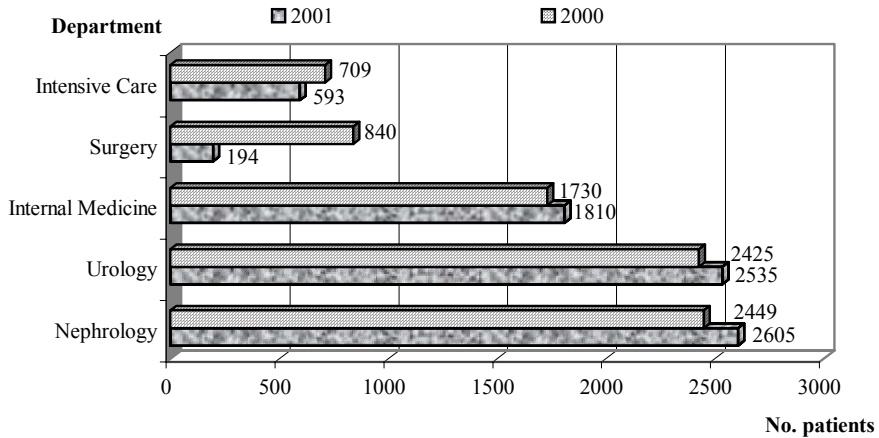


Fig. 3. The distribution of patients by unit care in 2000-2001 y

An analysis of patient age shows that the peak of distribution curve was situated between 55–64 years in 2000

and between 65–74 years in 2001 (fig. 4).

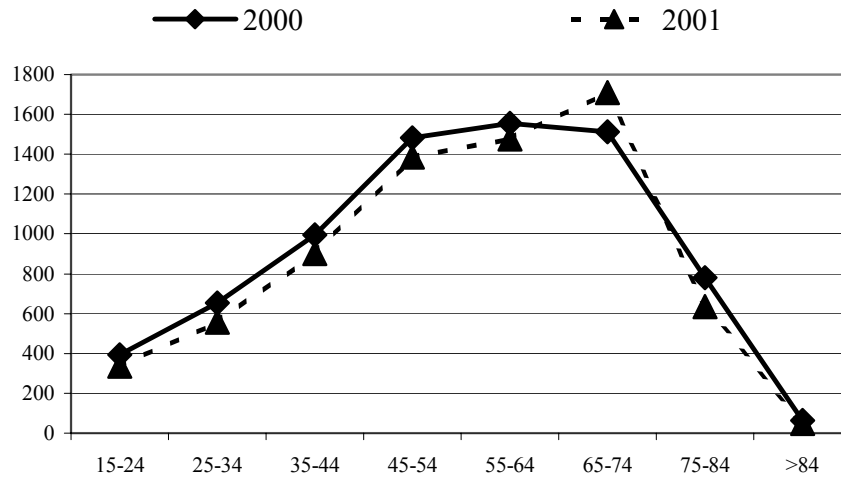


Fig. 4. Age structure of admitted patients in 2000-2001

Although no significant, the male patients exceeded the number of female one, in both years.

Another variable used to analyze the situation of admissions in hospital was the residence area, more patients living in urban (56.7% in 2000 and 58.2% in 2001).

Due to the complexity of provided hospital care, in this university hospital have been admitted patients referred from second contact level facilities from Iași city, surroundings or other neighbor districts. The last category of inpatients coming from other districts of Moldova region represented about one fifth from the total (27.4% in 2000 and respectively 21.2% in 2001).

Taking into account this fact, the utilization pattern of hospital resources is not relevant for a tertiary hospital, because in many cases it represents the first or second referral health facility (12). University hospitals should accept especially referrals from second level, but in reality this thing is impossible (this is the unique hospital with departments of urology and nephrology of tertiary level from Iași city and Moldova region).

The utilization pattern of services delivered in this hospital may be analyzed using three indicators: average hospital stay (AHS), bed turnover rate and occupancy rate. They represent a measure of allocative efficiency that requires that resources

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to be allocated to activities in which they have the highest value. The values of AHS for the whole hospital are close to those of a secondary level hospital and this is related to referrals from first contact

level (general practitioner) for the patients living in the city and suburbs (13). A detailed presentation of the utilization pattern through its three indicators is depicted in table 2.

Table 2. Average hospital stay, bed turnover rate and occupancy rate by care units in an university hospital (2000-2001)

Care unit	AHS (days)		Bed turnover rate		Occupancy rate	
	2000	2001	2000	2001	2000	2001
Internal Medicine	7.72	8.2	30.73	42.9	0.65	0.96
Nephrology	7.33	7.53	41.33	46.04	0.83	0.95
Surgery	5.95	4.91	39.26	71.36	0.64	0.96
Urology	5.24	5.62	34.82	51.3	0.5	0.79
Intensive Care	5.31	4.41	28.87	48.83	0.42	0.59
Total Hospital	7.72	7.98	31.67	39.79	0.67	0.87

The AHS is longer in internal medicine department in comparison with surgery and urology. Taking into account that inpatients admitted in surgical departments received specialized intensive care, the total average hospital stay for them (AHS in urology or surgery + AHS in intensive care unit) exceeded the level recorded in internal medicine and nephrology departments.

The analysis of bed turnover rate pointed out a higher rate during 2001 in all departments, suggesting less efficiency in case of a tertiary hospital. The improvement of occupancy rate from 0.67 in 2000 y to 0.87 in 2001 y is due to both AHS and bed turnover rate increase.

Except the intensive care unit, in all others the occupancy rate recorded favorable values in 2000–2001. A smaller number of beds in this department could improve the occupancy rate.

In analyzing these indicators we must keep in mind that in Romania a tertiary hospital should accept especially referrals from second level. In fact, this is quite impossible, in many cases this hospital representing the first or second referral (11). Taking into account this fact, the utilization pattern for the entire hospital may be considered a good one, in other words the activity is proper for university hospital.

The AHS in internal medicine and surgery departments may be compared with those recorded at districts and national level, as table 3 indicates.

For a tertiary hospital this reflects a favorable situation, because here bed turnover rate must be lower and AHS higher.

Hospital mortality rate decreased from 2.04 deaths per 100 inpatients in year

2000 to 1.5 in 2001. Distribution of the 152 deaths in 2000 and 109 in 2001 by departments doesn't suggest a specified model of mortality (fig. 5).

A significant reducing has been recorded in internal medicine and surgery departments. This suggests an improvement of the quality of hospital's activity.

Table 3. Average hospital stay in internal medicine and surgery departments at local, district and national level (2000)

Level	AHS (days)	
	Internal medicine	Surgery
“C.I. Parhon” University Hospital	7.7	5.9
Iași district	7.4	5.4
Romania	7.7	6

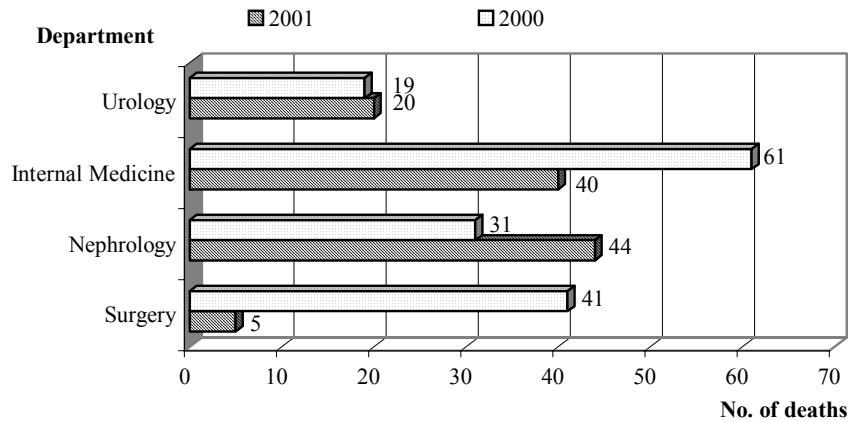


Fig. 5. Mortality by care units in 2000-2001

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CONCLUSIONS

1. "C.I. Parhon" University Hospital from Iași city represents a highly complex and costly health care institution, which covers the city area, surroundings as well as other districts from Moldova region.
2. The percentage of patients admitted into hospital decreased from 42.3 in 2000 to 36.1 in 2001.
3. The highest rate of admittance has been recorded in nephrology care unit, followed closely by urology.
4. Due to the high referral level, the average hospital stay was higher in comparison with the average recorded at the district level suggesting a good utilization pattern.
5. The occupancy rate increased from 0.67 in year 2000 to 0.87 in 2001.
6. Mortality rate decreased from 2.04 deaths per 100 inpatients in 2000 to 1.50 in 2001.
7. The access to hospital provided services is equitable for male and female of any age no matter of residence area.

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