

STATISTICS OF THE JOHANNESBURG HOSPITAL

DAVID GLAJCHEN,* M.B., B.CH. (RAND), M.R.C.P. (EDIN.), *Postgraduate Research Assistant, Department of Medicine, University of the Witwatersrand, Johannesburg*

Several investigating committees reporting on hospitalization in South Africa have emphasized the lack of comprehensive statistics on which to base their opinions and conclusions.^{1, 2} More recently the Commission of Enquiry into the high cost of medical services also expressed similar views:³

'Time and again the Commission was hampered in these efforts by the notable lack of factual information in the Republic. This lack was experienced on practically every level of the enquiry, and the Commission was obliged to find the basic information either by its own efforts or with the assistance of some interested group.'

In spite of these difficulties the report contains the most comprehensive information available at present in the Republic of South Africa on the financial aspects of medical and hospital care.

The recent introduction in the Transvaal Provincial Hospitals of a new system of collection and collation of statistics has remedied the previous shortcomings to some extent.^{4, 5} New methods for the collection, compilation, analysis and presentation of clinical records of patients are still to be introduced. It is therefore worth while reviewing the information that is at present available in the light of

modern trends and concepts in the study-field of hospital statistics.

DEFINITION OF HOSPITAL

There is as yet no internationally accepted definition of the term 'hospital'. In the Transvaal a hospital is defined in terms of its duties and functions.⁶ The facilities provided include: (a) food and accommodation; (b) nursing care; and (c) medical, surgical, obstetrical, dental, therapeutic or rehabilitative treatment.

The dental treatment is at present limited to the relief of pain and haemorrhage, elimination of sepsis and maxillo-facial surgery. Rehabilitation is usually limited to the restoration of the patient's health. Only recently has a rehabilitation clinic for vocational restoration been established at the Johannesburg Hospital.

This definition closely follows that recommended by the Expert Committee on Health Statistics (WHO) as a working basis:⁷

'A hospital is a residential establishment which provides short-term and long-term medical care consisting of observational, diagnostic, therapeutic and rehabilitative services for persons suffering or suspected to be suffering from a disease or injury, and for parturients. It may or may not also provide services for ambulatory patients on an outpatient basis.'

The Johannesburg Hospital has, in addition, been designated as a teaching hospital to provide clinical training for undergraduate and postgraduate medical students.

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USES OF HOSPITAL STATISTICS⁷⁻¹⁰

The study of hospitalization, patients, and their illnesses, on a statistical basis can be an important source of information for many purposes. Modification of the present methods of collecting this information would make it of use, in this country, for other than financial and administrative purposes. With the increasing introduction of automatic data-processing methods there is urgent need for the standardization of all the basic information collected so as to serve multiple purposes. The scope and value of the findings would be enhanced by the use of uniform and widely accepted concepts, methods and definitions.

The data can provide information necessary for such studies as the survey type of medical research of diseases and responses to treatment; as well as for the comparison of the work of various hospitals, regions, provinces and even different countries.

The uses of hospital statistics can be grouped as follows:

1. Effective administration and operation of a hospital to provide proper care for its patients.
2. Organization, coordination and planning of hospital services in an administrative area.
3. Economic utilization of hospital facilities within the general health programme of the community, region or country.
4. Assessment of the morbidity of the population including epidemiological aspects of diseases.

Hospital statistics can refer either to the hospital as a residential institution for medical care or to the patient as an individual or unit. The data at present available in the Republic of South Africa refer almost entirely to 'hospital statistics' as opposed to 'patient statistics'. Although many characteristics are common to both, there are distinct advantages in separating these 2 aspects.

HOSPITAL FACILITIES SERVING JOHANNESBURG

Hospital resources for the care of patients include not only the facilities for bed and ambulatory care, but for laboratory and radiological diagnostic services, operating theatres and physiotherapy. The supplementary facilities for rehabilitation, social services and dispensing also contribute to the professional care of patients.

The most important item is, of course, that of the facilities for bed care. The unit of measurement of these facilities is that of the 'hospital bed', and only this aspect of the hospital facilities will be considered in detail at present.

The White population of Johannesburg and its environs is served by hospitals under the control of the Provincial Hospital Services and of several private organizations. There are a total of approximately 3,239 beds available.¹¹ Table I lists the beds according to their various categories.

TABLE I. HOSPITALS SERVING WHITE POPULATION OF JOHANNESBURG

	<i>General medical and surgical installed beds</i>
Johannesburg Group of Hospitals	
1. Johannesburg Hospital	1,070
2. Fever Hospital	85
3. Queen Victoria Maternity Hospital	—
4. Transvaal Memorial Hospital for Children and E. P. Baumann Home	208
	1,363
Edenvale Hospital	136
South Rand Hospital	421
Private nursing homes	1,319
Total	3,239

The Infectious Fever Hospital is listed under the Johannesburg Group. The hospitals serving mental and infectious conditions such as leprosy and tuberculosis, which fall under the control of the State or the local authority, are excluded from the table and also from the present study.

The major work by far is done by the Johannesburg Hospital which, for practical and statistical purposes, is separated from the rest of the hospital group. The Ronald Mackenzie Block and the Wings, the Julius Jeppe and the Chamber of Mines Blocks are situated on a single site. The Colin Gordon Nursing Home, Ward 8 (for miscarriages) of the Queen Victoria Maternity Hospital and the Otto Beit Convalescent Home are close by. Other units are housed in the privately owned Princess Nursing Home, the Florence Nightingale Nursing Home and the Joubert Park Private Hospital.

The hospitals under the control of the Provincial Hospital Services allocate the beds in a fixed pattern for adults or children, male or female, and the various specialties. Table II shows the various subdivisions of beds in the Johannesburg Hospital.

TABLE II. JOHANNESBURG HOSPITAL ALLOCATION OF BEDS*

Medicine	328
Surgery	218
Gynaecology	82
Orthopaedics	92
Ophthalmology	34
Otolaryngology	25
Urology	40
Thoracic surgery	35
Plastic surgery	20
Neurosurgery	32
Neurology	8
Psychiatry	32
Radiotherapy	30
Private patients	25
Nursing staff	17
Convalescence	52
Total	1,070

* Excluded: 10 beds in Dental Hospital for maxillo-facial surgery.

Forty-six beds in the Colin Gordon Nursing Home had been on hire until the complete take-over by the Provincial Hospital Services and its incorporation into the Johannesburg Hospital in August 1962. The additional 40 beds so acquired were balanced by the closure of various wards in the rest of the Hospital in rotation for renovation and the use of up to 26 beds in the Otto Beit Convalescent Home for children from about that date. There has been no material change in the number of beds available in the Johannesburg Hospital between 1960 and 1964.

ADMISSION OF WHITE PATIENTS TO THE JOHANNESBURG HOSPITAL

An admission can be considered as the formal acceptance of a patient as an inpatient to receive medical and other professional services in the hospital, resulting in the allocation or the occupation of a bed. Patients discharging themselves or dying during the process of admission are also listed as hospital admissions.

A person above the age of 14 years is considered as an adult for purposes of hospitalization. The Johannesburg Hospital serves adult inpatients only, except in the sub-specialties of thoracic surgery, neurosurgery and ophthalmology. These inpatients are admitted through a single office, and are allocated to a particular unit or firm according to the day of the week and their medical or surgical requirements.

All admissions to the medical wards are direct because the continuous big demand does not allow for admission, by arrangement, of non-urgent cases. The wards serving general surgery, gynaecology and the sub-specialties of ophthalmology, otolaryngology, urology and orthopaedics, however, derive their patients from both direct and waiting-list admissions. The numbers of patients drawn from the waiting lists may be

markedly reduced or discontinued during the winter months when the direct admission rates are high.

The basic information of every admission, consisting of the name, religion, sex, marital status, home address, date of birth, date of admission and the number of the ward and unit to which the patient is sent, is recorded and stamped on a metal plate. The plates collected over a period of 24 hours from 8 a.m. are used to print the daily admission lists. These lists are then used for the calculations of the hospital statistics that are available.

On the whole the months of March and August are peak admission periods, with low figures in February, November and December (Table III). The gradual increase in the numbers of admissions over the past few years is well reflected in

TABLE III. ADMISSIONS TO THE JOHANNESBURG HOSPITAL, ALL CATEGORIES

	1960	1961	1962	1963
January ..	1,608	1,710	1,788	2,089
February ..	1,704	1,582	1,598	1,706
March ..	1,783	1,805	1,790	1,924
April ..	1,566	1,711	1,641	1,770
May ..	1,719	1,630	1,848	1,903
June ..	1,710	1,724	1,886	1,798
July ..	1,677	1,803	1,826	1,845
August ..	1,783	1,846	1,853	1,981
September ..	1,643	1,755	1,777	1,733
October ..	1,760	1,749	2,015	1,834
November ..	1,658	1,621	1,794	1,749
December ..	1,518	1,477	1,685	1,636
Total	20,129	20,413	21,501	21,968

the annual figures. In 1960 there were 20,129 admissions, gradually increasing to 21,968 in 1963. This is a most significant increase if considered in conjunction with the fact that there has been no material change in the number of installed beds over this same period.

This increase in the number of admissions must be evaluated in the light of the growing demand for inpatient care,^{12, 13} the number of extra beds made available, the rising bed occupancy rate, the change in the disease pattern and age distribution of the hospital population,^{12, 13} the length of hospitalization, and the hospital mortality rate.

The daily discharge lists are similarly printed from the plates removed from the file on the discharge or death of a patient. Those plates remaining in the file at the end of the month represent the patients still in hospital. These figures also serve as the basis for the calculations of the several measurements of hospital utilization.

MEASUREMENT OF HOSPITALIZATION

The pattern of utilization of the hospital facilities and resources by the inpatient can be indicated in several ways:

1. Statistics of patient movement over a given period. This includes the number of patients in hospital at the beginning of the period, the number admitted, discharged, and those remaining at the end of the period.

2. Statistics of days of care. This is best calculated from a regular daily census, each inpatient being counted as one patient-day. This is essential for the day-to-day working of a hospital. It can be expressed as the number of patient-days in a month or a year.

3. Statistics of other professional services. This is usually considered as the volume of services rendered in a month or a year.

Admissions and Discharges

The admission figures (Table III) are accurate, but unfortunately there is no easy way of separating the transfers between

the Nursing Home units and the rest of the Johannesburg Hospital from the direct admissions. The number of transfers is probably not much more than 60 in any one month. The effect of their inclusion, however, will be to increase artificially the number of admissions and thereby shorten the calculated period of hospitalization per admission. Medical surveys of inpatients, however, will not be influenced materially because the numbers are relatively small.

Because the available hospital statistics in Johannesburg are used primarily for administrative purposes, several important points must be considered and allowed for if these same figures are to be used for the survey type of medical or social research. The admission figures (Table III) include the private patients of all categories, members of the nursing and medical staff, and patients whose injuries fall under the Motor Vehicle Insurance or Workmen's Compensation Act. Because an independent research worker does not have free access to these patients for full clinical evaluation, and because the factors controlling their admission are overtly different from those of the free and part-paying (Provincial) patients, they are best excluded from inpatient clinical surveys, unless the administrative and financial aspects are being studied specifically.

The Provincial patients admitted during the years 1960 to 1963 are therefore listed in Table IV so as to make these figures freely available to the workers contemplating *ad hoc* surveys of inpatients.

TABLE IV. ADMISSIONS TO THE JOHANNESBURG HOSPITAL, PROVINCIAL PATIENTS

	1960	1961	1962	1963
January ..	1,390	1,472	1,502	1,871
February ..	1,443	1,311	1,329	1,436
March ..	1,429	1,517	1,525	1,635
April ..	1,303	1,405	1,377	1,450
May ..	1,448	1,375	1,543	1,621
June ..	1,448	1,469	1,568	1,492
July ..	1,404	1,519	1,540	1,515
August ..	1,515	1,585	1,516	1,666
September ..	1,393	1,507	1,482	1,418
October ..	1,482	1,472	1,628	1,577
November ..	1,408	1,348	1,505	1,441
December ..	1,283	1,246	1,424	1,328
Total	16,946	17,226	17,939	18,450

The discharges and deaths are noted daily by each ward. Because there is no daily census of patients, these ward notifications are used for the calculation, by subtraction, of the number of patients in hospital at any one time. Unfortunately, small notification errors become accumulative and by the end of any one month up to 300 extra patients, whose names were erroneously omitted from the daily discharge bulletins, may still be listed as inpatients. Corrections and adjustments have then to be made before the figures are used for the monthly hospital statistics. It is not possible at present to calculate the size or the significance of these errors that may have been introduced. The effects on such calculations as patient-days, bed occupancy rate, or length of hospital stay, which are derived from these basic figures, therefore, need to be assessed more fully.

Bed Occupancy

Until recently the statistics of the Johannesburg Hospital have been calculated on the basis of installed beds. This has now been replaced by the concept of available beds which is derived from the number of installed beds minus those withdrawn from use, plus any temporary additions. The bed occupancy rate, which is also used as a measure of the utilization of the hospital facilities, is calculated as the ratio of the daily average number of patients to the number of available beds during a given period, and is expressed as a percentage.

The annual figure, e.g. 82.8% (1962-63),⁶ is a composite one. It does not indicate the differences between the various hospitals in the Group, or the monthly or daily fluctuations. A

high occupancy rate over several days in the one hospital or unit is cancelled out by the low figures found at another time or in the other hospitals or units. The same applies, but to a lesser extent, if the calculations are made on a monthly basis.

Calculations of the bed occupancy rates for the Johannesburg Hospital for 1963 show a figure of 91% for the quiet months of November and December. This rises, however, to 96% or more during the peak months of March, June, August and September. A regular midnight census of occupied and vacant beds, carried out by the nursing staff for their own purposes, confirms this very high figure.¹⁴ If calculated on a daily basis the occupancy rates are even higher on occasions. On the whole, the monthly figures for 1963 are higher than those of 1960, 1961 or 1962 and is a reflection of the increase in the number of admissions.

Such high figures can be attained only when admissions are made to wards other than those receiving inpatients on that particular day. This is in spite of the use of up to 29 extra beds during the peak periods. The beds that remain vacant are found only in those wards set aside for sick nursing staff, ophthalmology, otolaryngology, and miscarriages (Ward 8, Queen Victoria Maternity Hospital).

The significance of these high occupancy rates are well expressed by the Snyman Commission:³

'An occupancy figure of 70% or higher is regarded as economically sound. For effective medical treatment, especially in emergency cases, an occupancy figure of 90% is already close to the danger mark. If a rapid turnover is added, i.e. if a short stay by patients is attained, a hospital is required to employ all its staff resources at the highest tempo.'

Statistics of other Professional Services

The information derived from the use of the radiological and laboratory diagnostic services, operating theatres, physiotherapy, social services and dispensing is used mainly for the estimation of costs and expenditure and need not be discussed any further at present.

Special facilities for the regular training of various personnel such as nurses, physiotherapists, radiographers, and medical students are listed in the Annual Reports of the Transvaal Hospital Services. These will also not be discussed at present.

PATIENT STATISTICS⁶⁻¹⁰

The data already discussed are mostly of a quantitative nature, whereas the patient statistics, apart from the length of hospitalization, are qualitative in character.

The concept of the length of hospitalization per patient is simple. It refers to the number of days the patient has spent in hospital between admission and discharge. The average length of stay is determined by dividing the total number of patient-days over a given period by the figures obtained by adding the number of patients in hospital at the beginning to the number of admissions during the same period. This is calculated as a monthly or annual figure.

The annual figures of 11.1 (1958-59),¹⁵ 12.3 (1959-60),¹⁶ 13.3 (1960-61)¹⁷ and 12.8 days (1961-62)¹⁸ are composite ones for the patients of all categories of the whole group of hospitals. They nevertheless tally closely with the figure of 12.4 days calculated from the actual period of stay of the free and part-paying admissions (Provincial patients) to the Johannesburg Hospital during October, November and December 1960.¹² The inter-hospital transfers were excluded in order to improve the accuracy, and the day of admission and the day of discharge have been counted as one day in these calculations.

The older patients stay longer in hospital than the younger adults. In addition the admissions to the medical wards show a much longer hospital stay than the corresponding surgical admissions, in all age groups (Table V).

TABLE V. ANALYSIS OF TOTAL ADMISSIONS TO THE JOHANNESBURG HOSPITAL (OCTOBER, NOVEMBER AND DECEMBER 1960)

Age group (in years)	Total analysed		Medical		Surgical	
	Number	Average stay (days)	Number	Average stay (days)	Number	Average stay (days)
Under 45	1,686	6-54	408	13-12	857	11-11
45-64	1,122	16-26	396	19-24	430	14-04
65 & over	828	19-10	392	20-57	233	16-61

There is however urgent need to study more fully the changes in the average length of hospitalization in relation to the increase in the period of final incapacity and the involvement of the hospital in the continued care of the severely disabled and chronic sick. The effects of the increase in the number of admissions demonstrated and the resultant very high bed occupancy rates on the length of hospitalization also need further study.

Hospital Morbidity Statistics⁷⁻¹⁰

More refined data about hospital utilization than that provided by patient movement, as discussed above, can be provided by considering these same figures in terms of the sex and age of the patients, and the diagnoses. The classification of the diagnoses is best done according to the International Classification of Diseases.¹⁹

One has still to decide whether to code the data so obtained according to the conditions requiring hospitalization or the primary disease of which the present illness may be a complication. The former approach is used primarily for the detailed study of the work of the hospital, whereas the latter method is used for morbidity studies.

The extension of a unified system of data collection, as envisaged for the Johannesburg hospitals, to the privately owned hospitals, the Sick Funds, the Medical Aid and Insurance Schemes, and to the hospitals of Edenvale and South Rand, which serve the population of greater Johannesburg, will add considerably to the general morbidity picture of the population at large.

The period of hospital stay is but an episode in the course of a patient's full illness. The hospital morbidity data when collected as a routine represent, therefore, only a cross-section of the various disease processes that are sufficiently serious for the admission of the patient to hospital. Such studies are not adequate for the evaluation of long-term illnesses, often requiring several admissions. Specific *ad hoc* surveys with follow-up studies are therefore necessary. Such a study of the elderly inpatients in the Johannesburg Hospital, with proper follow-up over several years, is being carried out and will form the basis of future reports.

Sampling for this survey type of medical research is usually done from the list of discharges. In the Johannesburg Hospital statistics based on the admissions or the discharges can be considered as equivalent because the turnover of patients is fairly uniform. The possible error introduced by the inclusion of the relatively small number of transfers in the admission lists is smaller by far than that produced by the discrepancies in the monthly discharge figures, as mentioned above.

THE POPULATION SERVED BY THE HOSPITAL

Seventy-five percent of the population of the Witwatersrand are covered for medical costs by the sick funds of the railways and gold mines, the various medical aid funds or insurance schemes.³ These patients, together with those who can afford the cost, seek treatment primarily from medical practitioners and are hospitalized in privately controlled institutions. There is at present little or no information on the exact population covered by age, sex, and geographical distribution, or on the volume and type of service given to these patients.

Those that have exhausted their funds because of a long-term illness, or who require highly specialized or costly investigations or procedures, such as renal dialysis, cardio-respiratory resuscitation or open-heart surgery, are referred to the Johannesburg Hospital for treatment. Congenital lesions, illnesses and injuries predating entry into the medical aid or insurance scheme, alcoholism, epilepsy, and psychiatric illnesses are excluded from the cost coverage, and these patients, similarly, present themselves at the Provincial hospitals for treatment. These factors result in an unusually heavy burden on the Johannesburg Hospital of patients who are old, chronic sick, disabled, unemployed or who have primarily socio-economic problems. This trend will be accentuated by the rapid ageing of the population served by the hospital.

A good cross-section of patients suitable for the training of medical students and nurses may, therefore, not be available. This expected change in the role of the Johannesburg Hospital as a centre for the treatment of acute cases, as a regional centre, and as a teaching hospital needs further study. The intended extension and modification of the present medical aid schemes may rapidly accentuate these trends.

QUALITY OF THE CARE GIVEN

One must accept that a list of the facilities and the services offered do not serve as a measure of the full need of these services or of their quality. The criteria for the measurement of the quality of the hospital care given have to be established. This is a full study on its own which still needs to be done.

SUMMARY

The inpatient statistics of the Johannesburg Hospital are reviewed in the light of modern trends and concepts. Expansion, modification and standardization of the present methods for the collection and collation of this data, would facilitate the development of uses other than financial and administrative as at present.

Although the number of hospital beds has remained about the same since 1960, there has been a steady increase in the number of admissions. Except for a few relatively quiet months, the hospital is working at maximum capacity for most of the year.

The present role of the hospital is discussed in relation to the population served and the type of illnesses treated. The ageing of the population and the extension of the present system of medical aid funds may accentuate the change in role from a hospital for acute cases to that serving patients requiring highly specialized and long-term care.

Some of the more important gaps in our knowledge are mentioned and the need for further studies indicated. The publication of this paper opens the way for the carrying out of survey type medical and social studies in the Johannesburg Hospital. The methods to be used are also outlined.

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