

Levels of health care at academic and regional hospitals in KwaZulu-Natal

K N Vallabhjee, C C Jinabhai, E Gouws,
D Bradshaw, K Naidoo

Objective. To assess the levels of health care based on hospital bed utilisation at seven academic and regional hospitals in KwaZulu-Natal.

Design. A prospective study. The registrar in charge of patients documented the level of care needed for each patient over 7 consecutive days. Independent assessment by consultants was used to validate the results.

Setting. All wards in public sector regional and tertiary hospitals with acute general beds in Durban and Pietermaritzburg, except intensive care, coronary care and respiratory units.

Participants. All inpatients present in the wards. The response rate of wards participating in the study varied between hospitals from 32% to 75%. Data on 14 858 patient days were analysed.

Outcome measures. Inpatients were classified according to levels of care based on patient days.

Results. The proportion of patients in the tertiary (King Edward) and regional hospitals requiring levels of care below that for which the hospital was designated ranged from 54% to 72% of the patient days. Wentworth Hospital, which is a tertiary referral centre, had 30% of its patient days judged to be below the designated level. Patient days below the designated level of care for that hospital were significantly higher in tertiary than in regional hospitals ($P < 0.001$).

Conclusions. All seven hospitals admitted patients at levels of care below that for which the hospital was designated. These findings have important implications for the efficient utilisation and planning of health and hospital services, and for their evaluation and management.

S Afr Med J 1997; 87: 1355-1359.

Since hospitals dominate the health services and comprise the largest and most costly operational unit of the health system, improving their efficiency may generate additional resources for the expansion and decentralisation of health

Department of Community Health, University of Natal, Durban

K N Vallabhjee, MB ChB, DOH, FFCH (SA), DHSM

C C Jinabhai, BSc, MB ChB, MMed (CM), FFCH (SA), DOH

K Naidoo, MB ChB, MMed (CM)

Medical Research Council

E Gouws, BSc, MSc

D Bradshaw, BSc, MSc, DPhil

services towards a comprehensive PHC-based district model.¹

Hospital utilisation review programmes to optimise efficiency and contain costs have considered appropriate utilisation of hospital beds with a focus on length of stay and the justification of admission.²⁻¹⁰ The Appropriate Evaluation Protocol (AEP), developed by the Boston University Health Care Research Unit,⁵ assesses the medical necessity of admissions and the appropriateness of patient days in a hospital. However, it is not sensitive to the appropriateness of level of care. No suitable instrument, internationally recognised or standardised and based on objective criteria, was found in the literature.

Given the magnitude of this study (seven hospitals) and numerous clinical disciplines with a wide variety of clinical conditions, it was not feasible to use a set of objective clinical criteria, which have been found to be 'labour intensive, time consuming and expensive'.¹¹ All studies attempting to categorise patients according to level of care or applying objective instruments to assess the appropriateness of hospital admissions rely on subjective opinion to some extent.¹² Zwarenstein recommends short written guidelines to standardise level of care judgements between observers and hospitals. Record reviews^{13,14} or prospective assessment^{15,16} of patients in hospitals have been used in different studies.

Few studies on appropriate utilisation of hospital beds have been undertaken in South Africa. Zwarenstein *et al.* found that 71% of patient days justified acute hospital care in medical wards in a teaching hospital in the Cape.¹⁷ Similar studies in the USA found that 66% of patient days and 75% of admissions⁶ were justified. These studies did not address whether patients requiring hospitalisation could have been treated at a lower level of care. In 1990, Bachmann *et al.*, using subjective assessments by registrars, found that 14% of patients should not have been admitted to a tertiary facility at all, and that 55% of patient days could have been spent at a lower level of care.¹⁸ Henley *et al.*, applying the Paediatric Evaluation Protocol in combination with a subjective measure of the level of care, found that in 98% of admissions, 79.5% of patient days were medically justified while 49% of admissions required tertiary care at a children's teaching hospital in Cape Town.¹⁶ American studies have found that 21.4% and 13.3%^{19,20} of patient days did not justify hospital care. In 1992, Schneider and Broekman, using consultants for a retrospective review of patient records in a teaching hospital in Johannesburg, found that 30%, 45% and 25% of inpatients receive a maximum of level 1 (community hospital), level 2 (regional hospital) and level 3 (tertiary hospital) care during hospitalisation, respectively (unpublished data). The results of an unpublished 1992 study of levels of care of patients at the Wits academic complex showed that 32% and 50% of beds were used at below level 3 care at Johannesburg General and Baragwanath hospitals, respectively (R Broekman — report to the Witwatersrand Academic Subcommittee), while a similar study at HF Verwoerd Academic Hospital in Pretoria showed that 68.4%, 21.7% and 9.9% of patient days required community hospital, regional hospital and tertiary hospital care, respectively (R Broekman — report to the Pretoria Academic Complex Subcommittee, 1992).

As the definitions and measures of appropriate bed utilisation vary considerably between different studies, comparisons can only be made with caution.

The utilisation of hospital beds in regional and tertiary hospitals in KwaZulu-Natal — according to the different levels of health care and in terms of the level designated for that hospital — has not been studied. This study estimated the hospital bed utilisation by assessing the level of care required by inpatients, on the basis of patient days, at seven tertiary and regional hospitals in Durban and Pietermaritzburg.

Definitions

1. The levels of care used in this study were adapted from the National Health Expenditure Review¹² (Table I). The classification of the hospitals was based on that used by the Department of Health as listed in the *Hospital and Nursing Yearbook* (Table II).

Table I. Definition and description of the levels of care

Level of care	Description	Personal	Services
1	Self-care	None	
2	Clinic	PHC nurses	No lab/X-ray
3	Community-health centre	PHC nurses and doctors	Basic lab/X-ray, casualty
4	District hospital	Doctors and occasional access to specialists in major disciplines	Basic lab/X-ray, theatre facilities, no ICU
5	Regional hospital	Specialists on ongoing basis in major disciplines, including psychiatry and pathology	Above services, ICU
6	Tertiary hospital	As above + experts in subspecialties + minor disciplines	Above services, scarce, sophisticated diagnostic and therapeutic management + specialist outpatient care

Table II. A description of the hospitals participating in the study*

Hospital	No. of beds	Departments	Ranking (LOC)	Response rate
King Edward	1 913	M, S, P, O/G, O, E, Ps, U, Op, PI, D, H	Tertiary (6)	36
Wentworth	390	Ns, N, C, CT, PI	Tertiary (6)	54
Addington	746	M, S, P, O/G, O, E, Ps, U, Op, PI	Regional (5)	66
R K Khan	684	M, S, P, O/G, O, E, Ps, U, Op, PI	Regional (5)	60
Prince Mshiyeni	1 010	M, S, P, O/G, O, E, Ps, U, Op, PI	Regional (5)	32
Edendale	1 605	M, S, P, O/G, O, E, Ps, U, Op, PI, H	Regional (5)	73
Northdale	385	M, S, P, O/G, O, E, Ps, U, Op, PI	Regional (5)	75

* *Hospital and Nursing Yearbook*, 1994.

LOC = level of care, E = otolaryngology, S = surgery, M = medicine, Ps = psychiatry, P = paediatrics, U = urology, O/G = obstetrics & gynaecology, CT = cardiothoracic surgery, PI = plastic surgery, Op = ophthalmology, O = orthopaedics, O (SS) = spinal surgery unit, PSx = paediatric surgery, D = dermatology, H = haematology.

2. A patient day is the measure used to indicate the services rendered to 1 inpatient admitted between the census-taking hours on 2 successive days. A stay of less than 1 day is counted as 1 patient day. For patients admitted and discharged on different days, the number of days is computed by counting all days from and including the day of admission to, but excluding, the day of discharge.

3. Major disciplines were medicine, surgery, paediatrics, obstetrics, gynaecology and orthopaedics.

4. Minor disciplines were psychiatry, otolaryngology, urology, paediatric surgery, plastic surgery and ophthalmology.

Methods

A prospective study was undertaken in seven major public sector hospitals in Durban and Pietermaritzburg in July/August 1994 with permission from the authorities. Two of the hospitals are tertiary and the others regional.

The following hospitals and wards were excluded: the state-aided mission hospitals; psychiatric hospitals; Clairwood Hospital, which essentially serves as a recovery and rehabilitation institution for patients transferred from the acute hospitals; intensive care, coronary care and respiratory units at the different hospitals.

The data collected included the hospital, department, ward, the date the study period began, inpatient number and the date of admission of each patient, and the daily level of care assessment for the study period of 7 consecutive days. The 7-day study period varied. Not all wards were observed during the same week. The data collection occurred within a 2-month period.

All consecutive patients admitted during the 7-day study period were selected, including new as well as old patients already in the ward on the first day of the study.

Registrars were required to include all patients during the study period, and consultants were requested to ensure that all patients admitted during the study period had been included. The assessment of the level of care required by a patient was a clinical decision. Patient days which warranted services that could have been provided at a less costly, lower-level institution, in an outpatient setting or at home were expressed as a percentage of the total patient days in the study.

The registrar/medical officer was chosen as the most appropriate person to make this assessment on the basis of clinical expertise and experience, as well as their being involved in the daily management of patients. The same person was asked to assess a given set of patients in the ward throughout the study period. All registrars and consultants participating in the study were briefed on the criteria for the different levels of care to be used during their ward rounds to assess the level of care at which each of their patients could have been managed. Consultants in the different departments were requested to make a similar assessment independently of the registrar in order to validate the latter's assessment. The degree of correlation between their assessments was measured. The response rate was estimated by expressing the number of wards participating in the study as a percentage of the total number of wards in the hospital. King George and Grey's

hospitals, with a response rate of 30% or less, were excluded from the data analysis. The results were analysed with a statistical analysis programme (SAS) and comparisons in proportions were based on the chi-square test.

The study period was not randomly selected. Seasonal variation was not considered to be an important factor influencing the level of care required.

Results

The response rate of participating wards ranged from 32% to 75%, and the profiles of the hospitals included in the study are shown in Table II. An analysis of 14 858 patient days showed considerable variation of bed usage at different levels of care in all hospitals, which varied from the designated level of care. A total of 490 patient days were independently assessed by registrars and consultants at Addington (surgery and psychiatry) and R K Khan (paediatrics and medicine). A kappa statistic of 0.864 was obtained, indicating good agreement.

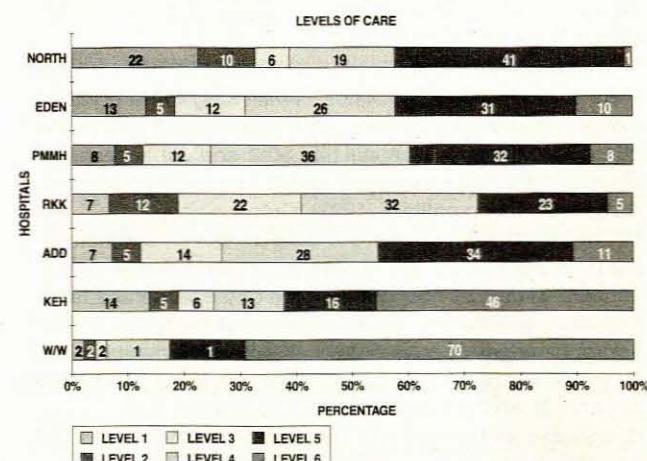


Fig. 1. Patient days assessed by level of care (%) in regional and tertiary hospitals in KwaZulu-Natal.

Proportion of patient days (PD) at different levels of care

The proportion of patient days at different levels of care for each hospital is presented in Fig. 1. Wentworth Hospital had a figure of 30%, and in the regional hospitals this ranged from 55% (Addington) to 72% (R K Khan) of patient days judged to be below the designated level. Patient days below the designated level for the institution, evaluated with regard to clinical departments, ranged from 45% (gynaecology) to 87% (obstetrics) in the major disciplines at King Edward VIII Hospital and 53% (medicine) to 75% (obstetrics and paediatrics) in the regional hospitals. The departments of medicine, surgery, paediatrics, obstetrics, gynaecology and orthopaedics accounted for 87.5% of patient days in the sample. The proportion of patient days below the designated level in these major departments ranged from 53% to 75% compared with a range of 14 - 58% in the minor departments such as otolaryngology, urology, ophthalmology and haematology.

Discussion

This study of seven tertiary and regional hospitals in KwaZulu-Natal shows that all these hospitals have varying proportions of patients at different levels of care, many of whom are below the level of care for which the hospital is designated by the Provincial Health Department. The level of care required by a patient varies on a daily basis. Should a hospital manage a patient from admission to discharge, irrespective of the level of care he/she may need, or should a hospital aim to minimise the proportion of patients requiring a level of care below that for which the hospital may be designated? The findings of this study and the answers to these questions have a number of policy, planning and cost implications. It must be stressed that the high proportion of patient days below the designated level of care does not necessarily indicate inefficiency, since all the patient stays could be appropriate while only a proportion of the patient days might be appropriate depending on the natural course of the illness. Likewise the proportion of patient days at levels of care 1 to 3, ranging from 6% to 38% (Fig. 1) and which did not justify admission, suggests potential areas of efficiency gains through total discharge from the hospital or outpatient treatment.

The results in this study are comparable with those found in other studies in South Africa. While King Edward VIII Hospital had 54% of patient days below level 6 care in this study, Baragwanath Hospital had 50% and Johannesburg General 30% (R Broekman — report to the Witwatersrand Academic Subcommittee, 1992), Groote Schuur 50%¹⁸ and HF Verwoerd 90%.²¹ Given the differences in methodology of the different studies, one should draw comparisons with caution, while also noting that some of these are academic hospitals, which may influence costs and the appropriateness of patient days. Wentworth Hospital, which does not see unferred patients, had the lowest percentage of patients who required a level of care below that designated for the hospital. This might indicate what could be achieved by implementing a hospital referral system, especially where the physical infrastructure already exists. 'Regional hospitals may be twice as expensive to run per inpatient as district hospitals, and central (tertiary) hospitals may be two to five times as expensive as district hospitals'.¹² However, this may not be desirable in other instances. The sophistication of staffing norms, skills and equipment would be primarily responsible for the cost differential between the different types of hospitals. One could adopt a layered approach within the same institution. Varying levels of care could be provided by altering the level of resources in different sections of the hospital. This could be applied to both regional and tertiary hospitals.

Generally, the major disciplines showed greater numbers of patients at levels of care below that designated for the institution, than the minor disciplines. This is to be expected as the minor disciplines are generally subspecialist disciplines and tend to receive mainly referred patients.

This study did not examine outpatient care. However, the proportion of patients requiring care at level 4 or below suggests a lack of an adequate primary health care infrastructure. It has been suggested that the burden on referral hospitals could be reduced if more patients were treated at primary and secondary level.^{22,23} A World Bank report reiterates that the majority of health care needs can

be met at the district level and referral hospitals (secondary and tertiary) are needed for only 10% of hospitalisations.²⁴ The primary care infrastructure of clinics and community health centres, together with suitably located district hospitals, needs to be developed. Where primary care services do exist, the quality of care and the community's perception of these services need to be improved to alter bed utilisation patterns effectively. A well-defined package of services is required at each level of care, with clearly structured lines of referral between the different levels and a combination of incentives (free services or nominal fees at the clinics) and disincentives (higher fees) at referral hospitals for primary care services.

Limitations of the study were that reasons for varying levels of care were not investigated and the response rate was less than optimal in some of the institutions. There may have been differences in perceptions between staff working at different levels of care, doctors working at lower levels believing that they could handle more at that level than doctors working at tertiary hospitals. This could have impacted on their clinical assessment of the level of care needed during the study. Inter-observer variation across hospitals, which was not assessed, among different registrars/medical officers of the various departments conducting the study, was controlled through briefing sessions, standardised instruction sheets and monitoring by the researcher. Validation was undertaken by independently assessing 490 patient days at Addington (surgery and psychiatry) and R K Khan (paediatrics and medicine) hospitals to produce a kappa statistic of 0.864, indicating good agreement between registrars and consultants. Ideally an analysis of patient stays should have been undertaken as part of the study.

It may be difficult for health workers to address issues that relate primarily to socio-economic conditions and the unavailability of primary care health services. However, administrative and clinical management protocols to reduce length of stay and admissions to hospitals need to be developed. Varying bed utilisation is just as important in short-stay cases as long-stay ones; the former tend to be due to inappropriate admissions or to delays in in-hospital procedures, while the latter are due to delays in discharge.⁴ Level of care studies should be used on an ongoing basis at institutional and departmental level to evaluate the effectiveness of interventions to reduce suboptimal bed utilisation, improve efficiency within hospitals and monitor trends in hospital performance. The use of level of care studies as one of the criteria on which to base resource allocation to hospitals is currently being debated.¹² These studies by their very nature would increase the awareness of cost-containment among health workers generally and clinicians in particular and the need to use resources (hospital beds in this case) more efficiently. Mechanisms to build such an awareness into a culture of efficient practice among health workers need to be reinforced continuously from the undergraduate training years onward.

Recommendations

1. Level of care determination as a methodological tool needs further development and standardisation.

2. Administrative and clinical management protocols should be formulated to ensure appropriate hospital bed utilisation.
3. Primary health care facilities and district level (community) hospitals need to be expanded and strengthened to cater for patients requiring ambulatory and first-level hospital referral care.
4. An effective referral mechanism should be implemented so that patients are managed at the lowest level of care appropriate to their needs.
5. The reasons for and costs of such high levels of variation in utilisation of hospital beds require further research.

We thank the Health Systems Trust and the HSRC Joint Programme for Health and Social Development for their support, the medical superintendents and the clinical staff who participated in the study, Drs S S Abdool Karim and M Zwarenstein (MRC) for their comments, Dr R Naidoo and staff of the Department of Community Health at the University of Natal for their support and assistance, Professor Jack Geiger (Department of Community Medicine, City University of New York, USA), Dr Nicole Schupk (School of Public Health, Columbia University, USA) and Dr Keith Sullivan (Centre for International Child Health, UK) for their guidance.

Copies of the full report are available on request from the Department of Community Health, University of Natal.

REFERENCES

1. Newbrander W, Barnum H, Kutzin J. *Hospital Economics and Financing in Developing Countries*. Geneva: WHO, 1992: 1.
2. Borchardt PJ. Non acute profiles: evaluation of physicians' non acute utilisation of hospital resources. *QRB* 1981; **7**: 21-26.
3. Restuccia JD, Gertmann PM, Dayno SJ, Kreger BE, Lienhart GM. A comparative analysis of appropriateness of hospital use. *Health Aff (Millwood)* 1984; **3**: 130-138.
4. Zimmer JG. Length of stay and hospital bed misutilisation. *Med Care* 1974; **12**: 453-462.
5. Gertmann PM, Restuccia JD. The appropriateness evaluation protocol: a technique for assessing unnecessary days of hospital care. *Med Care* 1981; **19**: 855-871.
6. Siu AL, Sonnenberg FA, Manning WG, et al. Inappropriate use of hospitals in a randomized trial of health insurance plans. *N Engl J Med* 1986; **315**: 1259-1266.
7. Torrance N, Lawson JAR, Hogg B, Knox JDG. Acute admissions to medical beds. *J R Coll Gen Pract* 1972; **22**: 211-219.
8. Wickizer TM, Feldstein PJ, Wheeler JR, McDonald MC. Reducing hospital use and expenditure through utilisation review — findings from an outcome evaluation. *Quality Assurance in Utilisation Review* 1990; **5** (3): 80-85.
9. Anderson P, Meara J, Brodhurst S, et al. Use of hospital beds: a cohort study of admissions to a provincial teaching hospital. *BMJ* 1988; **297**: 910-912.
10. Ermann D. Hospital utilisation review: Past experience, future directions. *J Health Polit Policy Law* 1988; **13** (4): 683-704.
11. Paranjpe N, Strumwasser I, Ronis D, Bartzack C, Zech C. Efficiency gains in utilization review. *American College of Utilization Review Physicians* 1989; **4** (4): 108-114.
12. Doherty J. National Health Expenditure Review. (Technical paper no. 2). Johannesburg: Centre for Health Policy, University of the Witwatersrand, 1994.
13. Formby DJ, McMullin ND, Danagher K. Appropriateness Evaluation Protocol: application in a children's hospital. *Aust Clin Rev* 1991; **11**(4): 123-131.
14. Winickoff RN, Fischer MA, August BJ. Appropriateness of short stay admissions for procedures in six veterans affairs hospitals. *Qual Rev Bull* 1991; **17** (12): 386-391.
15. Anderson G, Sheps SB, Cardiff K. Hospital-based utilisation management: a cross Canada survey. *Can Med Assoc J* 1990; **143**: 1025-1030.
16. Henley L, Smit M, Zwarenstein M. Bed use in the medical wards of Red Cross War Memorial Children's Hospital, Cape Town. *S Afr Med J* 1991; **80**: 487-490.
17. Zwarenstein MF, Benatar SR, Shaw LR. The pattern of care in the medical wards of a teaching hospital. *S Afr Med J* 1990; **77**: 460-463.
18. Bachmann OM, Zwarenstein MF, Benatar SR, Blignaut R. Levels of care needed by medical inpatients in a teaching hospital. *S Afr Med J* 1991; **80**: 477-480.
19. Kemper KJ. Medically inappropriate hospital use in a pediatric population. *N Engl J Med* 1988; **318**: 1033-1037.
20. Kreger BE, Restuccia JD. Assessing the need to hospitalise children: pediatric appropriateness evaluation protocol. *Pediatrics* 1989; **84**: 242-247.
21. Restuccia JD, Payne SMC, Lenhart G, Constantine HP, Fulton JP. Assessing the appropriateness of hospital utilisation to improve efficiency and competitive position. *Health Care Manage Rev* 1987; **12**: 17-27.
22. Wagstaff L. Utilisation of paediatric curative primary care services in Soweto. *S Afr J Epidemiol Infect* 1989; **4**: 54-56.
23. Rutkove SB, Abdool Karim SS, Loening WEK. Patterns of care in an overburdened tertiary hospital outpatients department. *S Afr Med J* 1990; **77**: 476-478.
24. World Bank. *Investing in Health: World Development Report*. New York: Oxford University Press, 1993.