

The effect of type of hospital and health insurance on hospital length of stay in Irbid, North Jordan

SALAH MAWAJDEH, YASEEN HAYAJNEH AND RAEDA AL-QUTOB

Jordan University of Science and Technology, Irbid, Jordan

The study aimed at examining the effects of type of hospital and health insurance status on hospital length of stay for three identified medical and surgical conditions. Medical records of 520 patients for the year 1991 were reviewed in one public and one private hospital. Comparison of hospital length of stay for the private ($n = 185$) versus public sector patients ($n = 335$) was carried out. The effect of presence of health insurance ($n = 189$) and the lack of it ($n = 325$) was also studied. It was found that the average length of stay in the public hospital was significantly longer than the private one (3.3 versus 2.7 days). In addition, insured patients had significantly longer hospital length of stay (3.3 versus 3.0 days). The results of the multi-variate analysis showed that after socioeconomic factors and clinical conditions of patients were adjusted for, the influence of hospital type and health insurance on hospital length of stay was about one day. The paper also discusses the need to base hospital cost-containment strategies on studies of hospital behaviour and performance.

Introduction

Numerous studies have documented that hospital care may be inappropriate or unnecessary in certain cases and situations.^{1–4} Studies of inappropriate hospitalization, including both under-hospitalization and over-hospitalization, have relied on measurement of hospital length of stay (LOS). In addition to the clinical factors affecting hospital LOS, non-clinical factors have been found to have a significant impact on hospital LOS among a large group of patients with uncomplicated conditions after adjustment for important clinical factors.⁵ Dowd et al⁶ recognized that there is no general agreement in the literature on the locus of control of hospital LOS decisions for individual patients. However, four categories of length of stay determinants have been identified.

a. Patient factors

Several studies have shown that patient age is positively correlated with LOS.^{7–9} Younger children stay longer in hospitals than older children.¹⁰ Among other demographic characteristics, Dowd et al noted that females and non-white patients exhibit relatively longer LOS.⁶ Social support was found to affect LOS. Single patients and children without a resident parent were found to exhibit longer LOS

than others.^{6,11–12} On the other hand, patients' income and the fee-for-service type of payment were not proved to be strong determinants of LOS.⁶

Severity of illness was found to be a significant predictor of LOS.^{13,14} Patients with psychiatric comorbidity were found to exhibit longer LOS than their counterparts.¹⁵ Complications arising during hospitalization exert a significant effect toward prolonging LOS. Hospital-acquired infections have been shown to significantly prolong the duration of hospitalization.^{15–18} It was found that post-operative infections caused an average prolongation of hospital stay of 8 days among patients who had experienced open heart surgery.¹⁸ Nutritional status of patients also affects LOS. Patients with low serum albumin levels were found to have longer LOS.^{19–20}

b. Physician factors

Studies have shown that patients of private group practice physicians and patients of out-of-hospital physicians exhibited shorter LOS than patients treated by house staff physicians and solo practice physicians.⁶ It has been argued that as soon as the patient is admitted to the hospital s/he loses control over his/her stay and this control is shifted to the treating

physician. However, no differences were noted in the average LOS between patients managed by family practitioners and those managed by internists.²¹

c. Hospital factors

A number of studies have indicated that many of the hospital characteristics are associated with LOS. Large hospitals and availability of beds were found to prolong LOS,^{7,22} while another study reported that large hospitals had shorter stays.²³ Hornbrook and Goldfarb found that Sectarian hospitals tend to have shorter stays than public hospitals.²³ A high nurse-bed ratio was also associated with short LOS.¹² Hospital LOS has been found to relate to areas of residence; central Australian hospitals were shown to have significantly longer LOS for hernia repair patients than district hospitals.²⁴ Furthermore, it was found that individuals hospitalized in Veterans Administration facilities exhibited an average LOS that was five days longer than that of comparable patients treated in private hospitals.²⁵

d. Source and type of payment

Inconsistency was noted among studies regarding the effect of type of health plan on LOS.⁶ While the literature reported that the overall LOS was 14% shorter for health maintenance organization patients compared to fee-for-service patients,²⁶ another report has shown that payer status is strongly associated with the use of cardiac procedures for patients hospitalized with heart disease, thus increasing hospital LOS.²⁷ Still other studies noted that the prepaid group practice mode of delivery has resulted in overall cost savings of 37% over fee-for-service delivery.²⁸ Uninsured new-borns in California had a LOS that was 16% less than all privately insured new-borns.²⁹ Uninsured maternity patients had a hospital stay shorter by one full day compared to insured ones.³⁰

Additional evidence on the effect of type of insurance plan on LOS comes from comparison of the behaviour of independent practice associations (IPAs). It has been shown that IPA patients had shorter LOS than patients under traditional insurance arrangements.³¹

Over-hospitalization and under-hospitalization have short-term as well as long-term impacts on the cost and quality of care provided.³ The increased cost of hospitalization comes as a result of using expensive resources rather than cheaper alternatives. Prolonged hospitalization is not only expensive but can also be

harmful to health;² hospitalized patients carry the risks of nosocomial infections and possibly iatrogenic complications, as well as social and emotional burdens.^{17,32}

Under-hospitalization, however, may be related to quality of care,³ in such a way that less than optimal length of stay, whether related to inappropriate clinical management or due to cost-containment strategies, may result in unsatisfactory outcome.

Hospitals, in developed countries, consume up to 40% of all health care spending.³³ Over-hospitalization increases hospital resource use. As these expenditures increase, a mounting pressure to contain hospital costs and a search for out of hospital arrangements continues unabated. Analysis of hospital behaviour in general, and the way hospitals deal with patients under various insurance plans, is of paramount importance. This issue becomes a priority in developing countries, where resources available for health care are scarce.

Aims of the study

This study attempts to analyze two important determinants of hospital length of stay in Irbid, the largest city in North Jordan. It aims at quantifying the impact of the health services factors 'presence of health insurance' and 'type of hospital' on hospital LOS, while adjusting for the relevant clinical factors. Study results are envisaged to complement and enrich the available health services literature, by providing comparative data from a developing country.

Background: health services in Jordan

The health services literature is rich with experience of the industrialized countries in utilization of hospital care and its determinants. However, little is known about the comparable situation in developing countries. In Jordan, a Middle-Eastern country of 4 million people, almost 7% of the people have no health insurance coverage, 28% have partial insurance, while 65% have comprehensive insurance coverage.³⁴

While health care in Jordan is provided to people from the public sector (government), United Nations Relief and Works Agency (UNRWA), private and non-governmental voluntary sectors, the ratio of non-governmental to governmental hospitals had increased from 1:3.9 in 1979 to 1:2.8 in 1989.³⁵ The number

of beds in the private sector hospitals had increased in a similar way; the ratio of private hospital beds to public ones had increased from 1:4.5 in 1977 to 1:2.5 in 1988.^{34,36}

The total expenditure on health in Jordan had increased from about JD 60 million in 1981 to about JD 150 million in 1989. The largest proportion of this expenditure is accounted for by hospital-related expenditures.^{34,35}

Methodology

This study is based on a retrospective review of the medical records of a public and a private hospital. The public one represents the main public hospital in Irbid city. The private hospital is considered comparable to the public one in relation to the socioeconomic level of the recipients of care and in terms of bed size. It represents the largest private hospital in the city. In order to eliminate the effects of type of medical problems and severity of illness on LOS, three medical and surgical tracer conditions were selected. To represent the different specialties dealt with in a general hospital, one diagnostic category for each medical or surgical specialty was chosen; caesarean section (C/S), appendectomy and asthma were selected to represent obstetrics and gynaecology, general surgery and internal medical specialty conditions respectively.

Study sample and sample selection

Sample size calculations were made based on the following considerations: $\alpha=0.05$, $\beta=0.8$, $\sigma^2:10$, and the accepted difference between the sample mean hospital length of stay and the population mean was half a day.

Hospital discharge records for the year 1991 were identified in both the private and public hospitals. A list of patient name and record number was obtained for each of the selected diagnostic conditions. Random number tables were then used to select cases. The eligibility criteria for the selection of records for review included:

1. Patient was not transferred from or to another hospital.
2. Patient did not have any medical complication or surgeries in addition to the original diagnosis.
3. Patient was not transferred to or from intensive care unit or from a medical ward to a surgical ward or the reverse.

4. Patient stay in the hospital exceeded 24 hours.
5. Patient was discharged alive.

In the event that a selected medical record did not meet the eligibility criteria, the next record on the list was selected. A pre-coded instrument was prepared for medical record abstraction. The study co-investigators collected the data by abstracting the medical records. The principal investigator provided a second opinion in cases of ambiguities in the data recorded in the medical record. Data from the coded sheet was then entered into dbaseIII+ computer program and the statistical analysis was done using the Statistical Analysis System (SAS).

Study variables

The outcome variable is the hospital LOS. It is a common proxy indicator of resource use,³⁷ and is an easy variable to measure. For some, it is regarded as the leading indicator of hospital resource use.³⁰

The main independent variable is patient insurance status which was divided into two main categories; the uninsured, which comprise the self pay group, and the insured, representing patients whose hospital bill is totally or partially covered by a third party.

Other independent variables included type of hospital (private versus public), patient age, sex and residence.

Results

The total number of reviewed records was 514. The average age of patients was 24 (+14) years. With the exclusion of C/S patients, males constituted 58% of the total sample. Urban and rural areas were equally represented. About 63% of patients were uninsured. An insured patient was significantly more likely to be a resident of a rural (65%) than an urban area (35%). With the exception of C/S, about two-thirds of patients, regardless of their insurance status, were users of a public hospital.

The distribution of the independent study variables showed little variation among the three diagnostic categories (Table 1). The mean hospital LOS of the total sample was 3.1 (± 1.4) days. As Table 2 demonstrates, insured patients exhibited statistically longer hospital LOS (3.3) compared to uninsured patients (3.0); the mean difference was 0.3 days with a p-value of 0.01. Private hospital patients stayed shorter periods than public hospital patients, with a

Table 1. Distribution of selected independent variables by diagnostic categories

Variables	Appendectomy		Diagnoses		Caesarean section		Total	
	n	%	n	%	n	%	n	%
Insurance								
present	60	31	67	48	62	35	189	37
absent	136	69	75	52	114	65	325	63
Hospital								
public	140	71	99	67	96	55	335	64
private	56	29	49	37	80	45	189	36
Residence								
urban	107	55	68	46	81	47	225	49
rural	89	45	80	54	92	53	262	51
Sex								
male	107	55	91	62	—	—	198	58
female	89	54	57	38	—	—	146	42

difference of about 0.6 days with a p-value of 0.001. Sex and area of residence did not play a significant role.

Within each diagnostic category, uninsured patients had shorter length of stay especially when they sought care from the private hospital. The results indicate that patients who underwent appendectomy in the public hospital stayed for about three days. This however was 0.36 days longer for insured patients compared to the uninsured. Conversely, appendectomy patients in the private hospital had a wide differential in their length of stay based on their

insurance status. Insured private sector patients had a LOS that was 1.63 days more than their uninsured counterparts. A similar pattern is depicted in the other diagnostic categories (Table 3).

In order to quantify the effects of the independent variables (presence or absence of health insurance, type of hospital) on LOS, controlling for other independent variables, a regression model was used. As shown in Table 4, the insurance status alone, regardless of the type of hospital, age, and type of illness studied, significantly prolonged hospital LOS by 0.39 days. Public hospitals influence on LOS was

Table 2. Mean hospital length of stay by selected independent variables

Variables	n	mean	p-value
Insurance			
present	189	3.3	0.014
absent	325	3.0	
Hospital type			0.001
public	335	3.3	
private	185	2.7	
Residence			0.61
urban	225	3.0	
rural	262	3.1	
Sex			0.41
male	198	2.7	
female	146	2.8	

Table 3. Mean hospital length of stay by diagnostic category, insurance status, and type of hospital

Diagnostic category	Insurance status	Hospital type	Length of stay (days)	
			n	mean
Appendectomy	not insured	public	99	3.4
		private	37	2.0
	insured	public	41	3.1
		private	19	3.6
Bronchial asthma	not insured	public	50	2.4
		private	25	1.4
	insured	public	43	2.6
		private	24	2.4
Caesarean section	not insured	public	57	4.1
		private	56	3.0
	insured	public	36	4.1
		private	24	4.5

Table 4. Multiple linear regression analysis of selected independent variables

Variables	Estimate	Standard error	t-value	p-value
Intercept	3.6	0.263	13.7	0.0001
Insurance	0.39	0.111	3.5	0.0005
Hospital type	-0.65	0.111	-5.8	0.0001
Age	0.02	0.004	5.2	0.0001
Appendectomy*	-0.62	0.129	-4.8	0.0001
Bronchial asthma*	-1.40	0.140	-10.3	0.0001

* The comparison group consists of patients who underwent a caesarean section.

about 0.65 additional days. Patient age had only a minimal influence on LOS (Table 4).

To test the possible interaction effect between health insurance and type of hospital, the regression model was modified. The repeat model revealed a statistically significant interactive effect. The influence of the interactive parameter on hospital length of stay amounted to 1.53 days.

Discussion

In line with reported literature, this study shows that insured patients have a longer length of stay even after controlling for the types of illness categories. Moreover, the study pinpoints differentials in hospital LOS between public and private hospitals especially when insurance status is considered. It is documented that insurance status is a stronger determinant of LOS in the private hospital compared to the public hospital.

The literature provides evidence that the locus of control of patients over their health decisions regarding hospital LOS once they are admitted, shifts into physicians hands. However, the current study results support the existing literature in highlighting the impact of patient factors as determinants of hospital LOS. Patient factors including insurance and socioeconomic status seem to determine the LOS in hospitals.

In Jordan, public hospital charges for services are affordable, even for the uninsured patients, especially when compared with private hospital charges. A hospital delivery in the public hospitals costs about JD 25. This is less than one week's pay for an unskilled worker. Private hospital delivery costs can be up to 10-fold that of government hospitals. This may explain the finding that LOS did not differ much in

the public hospital between insured and uninsured patients. In contrast, in the private hospital, LOS for uninsured patients was markedly shorter for all diagnostic categories studied. This shorter hospital stay could be related to the financial status of the patients, leading them to request an early hospital discharge.

The regression analysis shows that the combined effects of insurance and type of hospital on LOS is about one and a half days. Knowing that the average hospital LOS in this study was about three days, one can suggest that, on average, about one half of hospital LOS is attributed to factors outside a patient's medical condition.

The study findings indicate that public hospital patients stayed for 20% more days than their counterparts in the private hospital regardless of their insurance status or medical conditions. This finding raises questions as to the efficiency of resource use of public hospitals compared to private ones. It is, however, in agreement with the findings of another study which reported that public hospitals exhibited longer LOS than private hospitals.²⁵ One explanation offered for this finding is the large size of the public hospital. A number of studies^{7,22} have found that large hospitals have longer LOS than small hospitals.

The differential in the hospital LOS could be related to the severity of the illness. The design of the study could not account for this factor due to the incompleteness of the reviewed medical record data.

Summary

Patient hospital LOS is affected by known factors such as the type of patient illness. Hospital LOS is also known to be affected by the socioeconomic characteristics of patients. In this study, health services variables also affected hospital LOS to a large extent.

National cost-containment strategies directed towards reducing hospital costs should take into consideration the most efficient methods of resource use and management. It may be necessary that different sets of cost-containment strategies be designed depending on the mix of hospital types available in a particular country. In Jordan, as could be the case in many similar developing countries, the proliferation of private sector hospital beds, due to the expansion of existing facilities or to the establishment of new hospitals, should be regulated and monitored. At the

same time, the performance of public hospitals should be evaluated prior to the adoption and implementation of cost-containment intervention measures.

This study recommends more in-depth analysis of determinants of hospital LOS accounting for severity of illness and patient mix by type of hospital.

References

- ¹ Campion W, Bang A, May M. Why acute care hospitals must undertake long-term care. *New Engl J Med* 1983; **308**(2): 71-5.
- ² Connell F, Day R, Logerfo J. Hospitalization of Medicaid children: analysis of small area variation in admission rates. *Am J Public Health* 1981; **71**(6): 606-13.
- ³ Payne SM. Identifying and managing inappropriate hospital utilization: a policy synthesis. *Health Serv Res* 1987; **22**(5): 709.
- ⁴ Siu A, Sonnenberg F, Manning W et al. Inappropriate use of hospitals in a randomized trial on health insurance plans. *New Engl J Med* 1986; **315**(20): 1259-66.
- ⁵ Udvarhelyi I, Goldman L, Komarof A, Lee T. Determinants of resource utilization for patients admitted for evaluation of acute chest pain. *J Gen Intern Med* 1992; **7**(1): 1-10.
- ⁶ Dowd B, Johnson A, Madsoni R. Inpatient length of stay in Twin Cities Health Plan. *Med Care* 1986; **24**(8): 496-510.
- ⁷ Hedges JR, Osterud HR, Mullins RJ. Adult minor trauma patients: good outcome in small hospitals. *Ann Emerg Med* 1992; **12**(4): 402-6.
- ⁸ Manga P, Broyles R, Angus D. The determinants of utilization under a universal public insurance in Canada. *Med Care* 1987; **25**(7): 658-70.
- ⁹ Weibtraub WS, Ellis L, Craver J, Cohen C. Determinants of prolonged length of hospital stay after coronary bypass surgery. *Circulation* 1989; **80**(2): 276-84.
- ¹⁰ Maruszewski W, Krzywiecka M. Incidence of pneumonia and bronchitis in hospitalized children, duration of hospital stay and type of antibiotic therapy. *Pediatr Pol* 1988; **63**(10): 623-5.
- ¹¹ Taylor M, O'Connor P. Resident parents and shorter hospital stay. *Arch Dis Child* 1989; **64**(2): 274-6.
- ¹² Cristina S, Allevi A, Taioli E, Anzalone N, Polli E. Analysis of diagnostic procedure costs for cerebrovascular disease admission to a highly specialized hospital. *Ital J Neurol Sci* 1991; **12**(4): 397-405.
- ¹³ Pompei P, Charlson ME, Ales K, Mackenzie CR, Norton M. Relating patient characteristics at the time of admission to outcomes of hospitalization. *J Clin Epidemiol* 1991; **44**(10): 1063-70.
- ¹⁴ Thomas RI, Cameron D, Fahs M. A prospective study of delirium and prolonged hospital stay: explanatory study. *Arch Gen Psychiatry* 1988; **45**(10): 937-40.
- ¹⁵ Flournoy DJ, Hinahon J, Klein G, Hall L, Murray CK. Length of hospital stay in veteran service patients with nosocomial infections. *J Natl Med Assoc* 1990; **82**(4): 265-70.
- ¹⁶ Martin MA, Pfaller MA, Wenzel RP. Coagulase-negative Staphylococcal Bacteremia: mortality and hospital stay. *Ann Intern Med* 1989; **110**(11): 945-6.
- ¹⁷ Nagachinta T, Stephens M, Reitz B, Polk B. Risk factors for surgical wound infection following cardiac surgery. *J Infect Dis* 1987; **156**(6): 967-73.
- ¹⁸ Verkkala K. Occurrence of microbiological findings in postoperative infections following open heart surgery: effect on mortality and hospital stay. *Ann Clin Res* 1987; **19**(3): 170-7.
- ¹⁹ Rich M, Keller A, Schechtman K, Marshal W, Kouchoukos N. Increased complication and prolonged hospital stay in elderly cardiac surgical patients with low serum albumin. *Am J Cardiol* 1989; **63**: 714-8.
- ²⁰ Wey B, Mori M, Pfaller M, Woolson R, Wenzel R. Hospital acquired candidemia: the attributable mortality and length of stay. *Arch Intern Med* 1988; **148**: 2642-5.
- ²¹ Macdowell NM, Black DM. Inpatient resources use: a comparison of family medicine and internal medicine physicians. *J Fam Pract* 1992; **34**(3): 306-12.
- ²² Lagoe RJ. Hospital stays by diagnosis related group of neurologic patients treated medically. *Neurology* 1987; **37**(1): 139-45.
- ²³ Hornbrook M, Goldfarb M. Patterns of obstetrical care in hospitals. *Med Care* 1981; **19**(1): 55-67.
- ²⁴ Collopy BT, Cade RJ, Cocks JR, Davis CA. Comparison of length of stay after hernia repair in two Victorian hospitals. Standards Sub-Committee of the Victorian State Committee of the Royal Australian College of Surgeons. *Aust NZ J Surg* 1991; **61**(4): 276-9.
- ²⁵ Wolinsky F, Coe R, Mosely R. The process and outcome of hospital care for Medicaid versus privately insured hospital patients. *Inquiry* 1987; **29**(3): 366-71.
- ²⁶ Stern R, John B, Gertler P, Epstein A. A comparison of LOS and costs for HMO and fee-for-service patients. *Arch Intern Med* 1989; **149**: 1185-8.
- ²⁷ Weneker M, Weissman J, Epstein A. The association of payer with utilization of cardiac procedures in Massachusetts. *JAMA* 1990; **264**(10): 1255-60.
- ²⁸ Beck R, Horne J. Fee-for-service versus prepaid group practice and longitudinal effect on utilization. *Med Care* 1981; **19**(7): 759-65.
- ²⁹ Bravaman P, Egerter T, Showstack J. Differences in hospital resource allocation among sick newborn according to insurance coverage. *JAMA* 1991; **266**(23): 3300-8.
- ³⁰ Weis D. Uninsured maternity clients: a concern for quality. *Appl Nurs Res* 1992; **5**(2): 74-82.
- ³¹ Bradbury R, Golec J, Stearns F. Comparing hospital length of stay in independent practice association HMOs and traditional insurance programs. *Inquiry* 1991; **28**(1): 87-93.
- ³² Montgomery J, Gillmore D, Graham I et al. Klebsiella pneumoniae colonization in patients with spinal cord injury. *Diagn Microbiol Infect Dis* 1987; **7**(4): 229-36.
- ³³ McCarthy E, Finkel M. Surgical utilization in USA. *Med Care* 1980; **18**(9): 883-91.
- ³⁴ Samawi O. Health condition in Jordan. Unpublished data.
- ³⁵ Ministry of Health, Annual Statistical Report, Jordan, 1989.
- ³⁶ Ministry of Health, Annual Statistical Report, Jordan, 1977.
- ³⁷ Hadley J, Steinberg E, Feder J. Comparison of uninsured and privately insured hospitalizations: conditions on admission, resource use and outcome. *JAMA* 1991; **265**: 374-9.

Acknowledgement

The study investigators would like to extend their gratitude to all hospitals participating in this study without whom the study could not have been completed.

Biographies

Salah Mawajdeh, PhD, MD, MPH, is an Assistant Professor of Health Policy and Management in the Faculty of Medicine, Jordan University of Science and Technology.

Yaseen Hayajneh, BSc, MSc, is a Lecturer in the School of Nursing, Jordan University of Science and Technology.

Raeda Al-Qutob, PhD, MD, MPH, is an Assistant Professor of Maternal and Child Health, and Director of the Family Health Group, Jordan University of Science and Technology.

Correspondence: Salah Mawajdeh, PO Box 1073, Marj El-Hamman, Amman, Jordan.