Original Article

Burden of Hospitalized Pediatric Morbidity and Utilization of Beds in a Tertiary Care Hospital of Kolkata, India

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ABSTRACT

Background: Childhood morbidity consumes a substantial portion of health care resources in terms of hospital bed utilization, and overload in hospital ward remains a major concern in many countries, including India. A possible way to minimize the problem of scarcities of bed is to analyze the pattern of bed utilization by causes and plan services accordingly. **Objectives:** To determine the burden of pediatric morbidity and utilization pattern of pediatric beds in a tertiary care hospital. **Materials and Methods:** A retrospective analysis of pediatric inpatient's records was conducted over a period of 1 year from 1 January 2007 to 31 December 2007. **Results:** Of 3983 total admitted cases, about one-third were infants, of which neonatal and post-neonatal age group constituted 45% and 55% of the cases, respectively. In terms of bed-day utilization, infants, 1-4 years and 5-11 years age group accounted for 35.10%, 32.58% and 32.32% of total days of admission, respectively. Utilization of pediatric beds by major causes of morbidity was respiratory tract infection (22.23%), convulsive disorder (12.68%), accident and poisoning (6.07%), diarrheal disease (4.97%) and chronic hemolytic anemia (4.42%). **Conclusion:** A minor change in admission policy through provision of day care unit for management of certain cases would allow efficient use of hospital beds.

Keywords: Hospitalized pediatric morbidity, bed days utilization, acute respiratory infection, diarrhea

Introduction

Childhood morbidity consumes a substantial portion of health care resources in a hospital. The overload in hospital ward remains a major source of concern in many countries, including India, for policy makers. The availability of beds is perhaps the single most important factor in determination of the hospital utilization in a country.[1] In India, shortage of hospital beds is a huge problem, the average bed population ratio being 9 per 10,000 population in comparison with the world average of 27 per 10,000 during 2000-2009.[2] As the demand for health care increases, a high efficiency on limited resources is necessary for affordable high-patient service levels. A possible way to minimize the problem of scarcities of beds is to look for variation in bed utilization by different causes across the country and plan services accordingly.

A country needs sound epidemiological information to prioritize, plan and implement the public health care system effectively. Morbidity data from hospitalized patients reflect the causes of major illnesses and care-seeking behavior of the community. Understanding of hospital burden due to different childhood morbidity could contribute to a more effective approach in designing appropriate service. This information also provides the basis for patient care and bed management in a hospital. There are many factors affecting bed utilization, namely the allocation of beds, patient placement and patient admission policies, etc. Bed allocation means assigning beds to various patient categories according to medical

Access this article online	
Quick Response Code:	**Website:** www.ijcm.org.in
	DOI: 10.4103/0970-0218.103474

speciality, accommodation type, needs of the patient and educational requirements in teaching hospitals along with cost consideration. Patient placement policies are rules indicating which patients can be put into which beds. Admissions policies deal with types of cases, patient demands and availability of beds.

Studies on magnitude and burden of child morbidity in terms of hospital bed utilization are limited. The present study was undertaken with the objective to find out the pattern of hospital bed utilization by different childhood morbidity and length of stay in the hospital.

Materials and Methods

It was a descriptive study with retrospective analysis of records conducted in the in-patient Pediatric Department of R. G. Kar Medical College and Hospital, Kolkata. The study involved the analysis of records of pediatric patients who were discharged from the Pediatric Department over a period of 12 months from 1 January 2007 to 31 December 2007. Data were retrieved from the admission and discharge registers and, in case of any confusion, bed head tickets were also consulted. This hospital is a Government tertiary-level referral center with 60 effective beds in the Pediatric Department. Children under 12 years of age with illness requiring hospitalization are admitted to this Pediatric Department. Pediatricians are available for consultation round-the-clock under the guidance of senior consultants. There is a neonatal care unit that admits babies delivered within the hospital as well as referred from outside. As there is no trauma care or burn unit in this department, all surgical pediatric cases are admitted to the surgery department. Children suspected to suffer from cholera or other infectious diseases are not admitted in this hospital; they are referred to another hospital named Infectious Disease and Beliaghata General (ID and BG) hospital for management. Before conducting this study, approval was obtained from the Institutional Ethics Committee. The study was conducted during a period of 2 months from January 2008 to February 2008. Total discharged patients during the reference period of data collection (2007) were 4008, out which information on 25 cases was incomplete; thus, finally, 3983 cases were studied. The investigators abstracted all the children's medical records from the pediatric department using a pre-designed data collection tool. The information obtained included infant morbidity (illness or adverse events that lead to hospitalization) and clinicotherapeutic details (history of illness, physical examination, laboratory investigation, diagnosis, onset of illness, duration of illness, severity, treatment, complication, treatment outcome and length of stay in hospital). The primary condition requiring hospitalization was noted as the principal diagnosis. The morbidity that co-existed with the principle diagnosis during stay in the hospital or complication developed

during management of the case was ignored as diagnosis.

Definitions of the Items Used in the Study are as Follows

Inpatient days of care
This includes the cumulative bed days occupied by all patients during the reference period of study.

Beds days available
The maximum number of inpatient days of care that would have been provided if all beds were filled during the year. As the effective beds available in the pediatric department during the study period were 60, the available bed days would be 60 × 365 = 21,900.

Bed occupancy rate
The occupancy rate is a calculation used to show the actual utilization of an inpatient health facility for a given time period. To calculate BOR, we used inpatient days of care and bed days available in this formula: (Inpatient days of care/bed days available) × 100.

Analysis
Collected data were compiled on a Microsoft excel worksheet. Data were analyzed using frequency, proportion and mean.

Results

Of the total admitted cases, about one-third were infants, of which neonatal and post-neonatal age group constituted 45% (549/1226) and 55% (677/1226) of the cases, respectively. Total admission days in the infancy and 1-4 years age group were 8817 days and 8184 days, which accounted for 35.10% and 32.58% of the total days of admission, respectively [Table 1]. Further analysis revealed that 49% and 51% of the total admission days during infancy were noted in the neonatal and post-neonatal cases, respectively. The average length of hospital stay in the present study was 6.31 days; the analysis of length of hospital stay by sex indicated that it was a little higher in female subjects (6.54 days) than that in male subjects (6.16 days).

The average length of hospital stay during infancy was 6.6 days. Table 2 depicts the causes of morbidity in terms of frequency and bed days' utilization by causes. Of all the causes, respiratory tract infection, including acute respiratory infection (ARI), was the leading cause for hospitalization (17.52%), followed by chronic hemolytic anemia (CHA) (13.93%), convulsive disorder (13.33%), diarrheal disease (7.83%) and accident and poisoning (6.38%). But, while we analyzed the morbidities by bed utilization, it revealed that the major contributors were respiratory tract infection (22.23%),

followed by convulsive disorder (12.67%), accident and poisoning (6.07%), diarrheal disease (4.95%) and CHA (4.42%). We have analyzed the sex distribution of the morbidity profile, which revealed that there was a male preponderance of admission in certain categories of diagnosis in comparison with the overall male proportion of admission. It was observed that proportion of male admissions were 65.38% (51/78), 64.03% (340/531) and 61.98% (344/555) in tubercular infection, convulsive disorder and low birth weight and malnutrition admission, respectively, which were higher than the average proportion of overall male admission (61.11%; 2434/3983). On the other hand, female admission rate was relatively higher in septicemia (45.35; 39/85), non-physiological hyperbilirubinemia (42.31; 22/52) and birth asphyxia (42.11; 32/76) in comparison with the average proportion of female admission (38.89; 2434/3983). The BOR in the present study was 114.70, indicating the overcrowding in the ward.

Discussion

Hospitalized morbidity helps us to understand the health care needs of the community, judge the adequacy of health care resources and thus help in planning and efficient bed management in the hospital. A total of 3983 children comprising of 61.12% males and 38.88% females were

admitted to the Pediatric Department, of which about one-third were infants. Singhi[3] also observed a comparatively higher rate of admission by male children both in tertiary care institute and in community hospital. This could be related to preferential care to male child in the society along with the biological vulnerability of male to infection. Male preponderance in admissions was noted in tubercular infection, convulsive disorder and low birth weight and malnutrition, whereas female preponderance in admission was higher with acute conditions like septicemia, non-physiological hyperbilirubinemia and birth asphyxia.

In the present study, about one-third of total admissions (30.78) were during the infancy, but, in terms of bed days occupancy, they accounted for relatively higher proportion of the total days (35.10%) of admission. The neonatal period is the most vulnerable period for infants, which contributed to 45% of the total infant admissions and occupied 49% bed days. The bed days utilized by the 1-4 years age group is more or less similar to their proportion of admissions. However, the 5 years and above age group used relatively less proportion of bed days (32.32%) in relation to the percentage of total admission (36%). This indicates that infants are at greater risk and in need of proportionately greater health care resources for their care. In the present study, we observed higher admission in the neonatal age group in comparison with the observations by other workers.[4]

The average length of stay per patient in the present study was 6.3 days. Different workers reported variable length of stay in their studies; Dharnidharkera[5] reported a higher mean length of stay (7.9 ± 2.7 days) and Deivanayagam[6] noted 5.2 days average length of stay.

Table 1: Distribution of the study population according to age, sex and occupied bed days

Age group (years)	Male no. (%)	Female no. (%)	Total no. (%)	Bed days occupied no. (%)
<1	740 (60.37)	486 (39.63)	1226 (30.78)	8817 (35.10)
1–4	786 (60.07)	522 (39.93)	1308 (32.84)	8184 (32.58)
5–11	908 (62.70)	451 (37.30)	1449 (36.37)	8119 (32.32)
Total	2434 (61.12)	1549 (38.88)	3983 (100.00)	25,120 (100.00)

Table 2: Distribution of pediatric morbidity and bed days utilization

Morbidity	No. of patients	Proportion of morbidity	Length of stay (days)		Bed days occupied	Proportion of bed days occupied
			Average	SD		
Respiratory tract infection including ARI	698	17.52	8.00	4.24	5584	22.23
Convulsive disorder	531	13.33	5.99	3.34	3183	12.67
Accident and poisoning	254	6.38	6.00	6.33	1524	6.07
Diarrheal diseases	312	7.83	3.98	2.5	1243	4.95
Chronic hemolytic anemia	555	13.93	2.00	2.06	1110	4.42
Septicemia	86	2.16	11.03	3.72	949	3.78
Obstructive airway disease	184	4.62	5.00	1.84	920	3.66
Low birth weight and malnutrition	96	2.41	8.00	3.38	768	3.06
Hyperbilirubinemia (excluding physiological jaundice)	52	1.31	13.00	3.61	676	2.69
Tubercular infection	78	1.96	7.36	2.68	574	2.29
Birth asphyxia	76	1.91	6.00	3.98	456	1.82
Viral fever	86	2.16	3.81	1.78	328	1.31
Others*	975	24.48	8.00	6.41	7805	31.07
Total	3983	100.00	6.31	5.05	25,120	100.00

*The cases that were not classified earlier, and in some cases where final diagnosis was not available, were included in the "others" category

Of all the causes, respiratory tract infection including ARI was the leading cause for hospitalization (17.52%), followed by chronic hemolytic anemia (13.93%). Other researches,[3,5,7] however, reported diarrheal disease as the most common hospitalized morbidity, followed by respiratory tract infection. This may be due to the fact that cholera and or other infectious diseases are not admitted in this hospital; they are referred to the Infectious Disease (ID and BG) hospital for management.

It is clear from the analysis that respiratory tract infection was the leading cause both in terms of number of cases and utilization of bed days, while CHA was the second most common cause of admission, but, in terms of bed days utilization, it ranked fourth from the top [Table 2]. Most of the CHA cases were thalassemia cases and were admitted for blood transfusion. This group could have been managed on an outpatient basis and thus would save scare resources. If the hospital authority makes provision for day care to manage these cases, it would allow 4.42% of bed days for alternate use.

Conclusion

Respiratory tract infection including ARI was the leading cause for hospitalization; these conditions, together with convulsive disorder, consumed significant health resources in terms of bed days utilization. As a result of this study, certain policy changes that should improve the efficiency of bed utilization at the hospital waere identified. Thus, an alternative adaptive approach for efficient resource usage by optimization of resource utilization is warranted.

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