Sir Salimullah Medical College Journal

Sir Salimullah Med Coll J 2022; 30: 168-174

Original Article

DOI: https://doi.org/10.3329/ssmcj.v30i2.61934

Assessment of Health Performance and Outcome with Disease Profile among Paediatrics Population of a Non COVID Tertiary Care Hospital in Bangladesh in COVID Era

Nusrat Kamal[1], Farzana Amin[2], Lubna Ahmed[3], Vikarun-nesa[4], Lutfannessa[5], Shukhamoy Kangsha Banik[6]

Article information
Received: 11-03-2022
Accepted: 11-06-2022

Cite this article:
Kamal N, Amin F, Ahmed L, Nesa V, Lutfannessa, Banik SK. Assessment of Health Performance and Outcome with Disease Profile among Paediatrics Population of a Non COVID Tertiary Care Hospital in Bangladesh in COVID Era. Sir Salimullah Med Coll J 2022; 30: 168-174

Key words:
Health performance tool, Disease profile, Outcome, Paediatric disease, COVID-19, Tertiary care teaching hospital.

Abstract:

Background: *Hospital based data of diseases profile are reflection of community at large. Being in COVID pandemic era, knowledge of disease pattern and outcome in children is crucial for proper resource allocation and health care planning. Performance evaluation of each hospital has become central to the concept of quality improvement.*

Objective: *to evaluate disease pattern and outcome of a non COVID hospital in COVID era.*

Methodology: *This retrospective descriptive study was conducted in pediatric unit (1 months to 14 year) of Sir Salimullah Medical College Mitford Hospital from January, 2021 to December, 2021. Medical records were reviewed and analyzed for age, gender, disease, duration of hospital stay, bed occupancy rate and outcome.*

Results: *Total 4346 patients were admitted of which male is 68%. Most admission was in between 1 month to 12 months of age which is 48.5%. Bronchopneumonia, Dengue and Bronchiolitis became the top 3 cause of admission. 70% patients stayed less than 7 days. 2% patients were referred of which maximum were later diagnosed as COVID-19 patients. Bed Occupancy rate was 138% and Bed Turn Over rate was 72.4 patients/bed/year. Mortality rate was 1.6%.*

Conclusion: *To achieve SDG 3 goal by 2030, assessment of hospital performance as well as disease profile of each hospital is needed for proper resource allocation and community improvement.*

1. Registrar Paediatrics, Sir Salimullah Medical College Mitford Hospital, Dhaka.
2. Research Assistant, Sir Salimullah Medical College Mitford Hospital, Dhaka.
3. Indoor Medical Officer, Sir Salimullah Medical College Mitford Hospital, Dhaka.
4. Assistant Registrar, Neonatology. Sir Salimullah Medical College Mitford Hospital, Dhaka.
5. Professor of Paediatrics, Institute of Child and Mother Health. Matuail, Dhaka.
6. Professor and Head of Neonatology. Sir Salimullah Medical College, Dhaka.

Address of Correspondence: Dr. Dr. Nusrat Kamal, Registrar Paediatrics, Sir Salimullah Medical College Mitford Hospital, Dhaka. Email: dr.nkema@yahoo.com. Cell Phone-01717443817. ORCID: 0000-0003-2392-4292

Introduction:

Child's mortality and morbidity is one of the sensitive indicator of a country's development[1]. Although lack of proper documentation and statistics, it became difficult for a developing country like us to assume or predict disease trend.

Knowledge of the morbidity profile enables policymakers, government to reach informed decisions on allocation of human and material resources to the various areas within the health sector. Also, an estimate of disease-specific burden is required for setting national priorities for health[2].

Hospital records are considered reliable and used all over the world[3]. It also give an insight of disease burden in the community. Such understanding of epidemiological trend in hospital admissions is critical for health care planning and appropriate resource allocation[4].

Hospital as a part of Health care system remained under resource constraint.[5] Performance or efficiency evaluation of hospitals always play a vital role in healthcare organizations to address the best use of resources and rationing of demand.[6] Out of 218 indicators used in hospital performance assessment, the most frequently used one is bed occupancy rate (BOR) and Bed Turn over rate (BTR).[7] Bed occupancy rate (BOR) is a measure of utilization of the available bed capacity in the hospital and it reflects efficiency in the use of hospital beds. A hospital can be said to be operating efficiently at BOR of 80–90%.[8] BOR over 100% reflects overburden.[9] Bed turnover rate (BTR) measures productivity of hospital beds, and it represent the number of patients treated per bed in a defined period, usually 1 year.[8]

Sir Salimullah Medical College Mitford hospital is the 1st hospital in Bangladesh established on 1st May, 1858 in the older pat of Dhaka city and one of the earliest hospital in this subcontinent situated on the bank or river Buriganga. Being a tertiary care teaching hospital it not only serve the people of huge densely populated old Dhaka, but also the people of nearby districts connected by river.

Bangladesh has already achieved MDG-4 (Reduce child mortality) goal. Bangladesh Government has taken several policy and project to improve child health and to decrease mortality and morbidity. Now, Government's aim is to achieve SDG-3 (good health and well-being) by the targeted year 2030.

The development of a large computerized database can be challenging in resource-constrained countries but is necessary for timely systematic auditing and quality assurance procedures.[10] Understanding of epidemiological trend of disease with its pattern and outcome will helps us to improve specific hospital care setting and to add on achieving SDG-3 Goal. This observational, descriptive study was conducted to know the epidemiological disease trend, admission pattern with its outcome as well as assessment of hospital performance of this renowned, tertiary care, teaching hospital.

Materials and Methods:

This retrospective, observational descriptive study done in paediatric unit of Sir Salimullah Medical College Mitford Hospital from January, 2021 to December, 2021.

Inclusion criteria: All the admitted children during study period aged > 28 days to up to 14 years age (upper age limit for admission in paediatric ward) were included in this study.

Exclusion criteria: Neonate (0 days to 28 days) are managed in separate unit hence were excluded in this study.

Data were collected from hospital register, patient file record, Death certificates. Data extracted from records including total admitted patients, age, gender, month wise admission, mean duration of hospital stay, total duration of hospital stay by each patient, diagnosis and outcome. Final diagnosis was based on final assessment of corresponding managing unit. Outcome were categorized as discharged with advice (DA), Discharge on request (DOR), leave against medical advice (LAMA), refer and death. Data were entered into SPSS 26 and analyzed. Bed Occupancy rate (BOR) and Bed Turn Over rate (BTR) were calculated as per definition.[8] Quantitative data have presented by histogram, number (frequency). Qualitative data have presented by pie chart, simple bar diagram.

Results:

Total 4346 patients were admitted during this study period. Among which male patients were 68% (2963) and female were 32% (1383) (Fig-1).

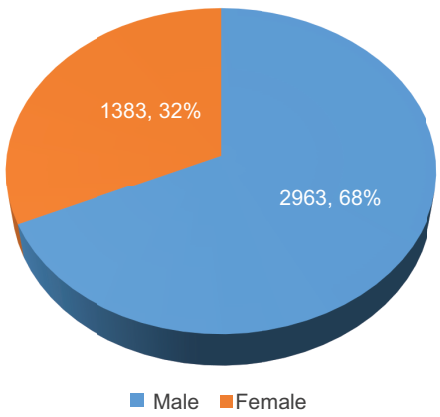

Fig.-1: *Gender distribution of admitted patients (N= 4346)*

Most of admitted patients were infant (1 month to 1 year) that is 48.5% followed by under 5 children which was 31.7% (Fig-2).

Although a lot of varieties of patients were admitted, main disease for admission from each system has shown in Table-I. Some diseases had repeated admission like different types of Nephrotic syndrome, Epilepsy, Cerebral Palsy, Thalassemia etc. Some diseases had very less frequency of admission hence kept in others.

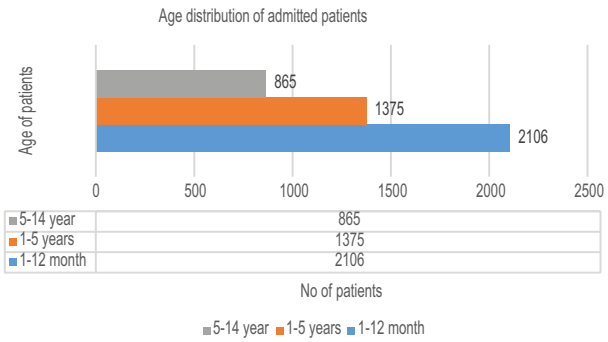

Fig-2: *Age distribution of admitted patients*

Table-I. Main diseases from each system that lead to admission

Diseases	Number (N)	Frequency (%)
Respiratory		
Bronchopneumonia	649	15
Brochiolitis	423	9.8
Bronchial Asthma	101	2.3
Pulmonary TB	14	0.3
Empyema Thoracis	7	0.2
Pleural effusion	6	0.13
Cardiovascular		
VSD with pneumonia	21	0.5
VSD with Heart failure	16	0.4
PDA	11	0.3
Gastro-Intestinal		
Acute watery diarrhoea with different grade of dehydration	347	8
Severe acute malnutrition	79	1.8
Acute viral hepatitis	63	1.4
CLD with Portal Hypertension	59	1.4
Sub-acute Intestinal Obstruction	14	0.3
Acute Gastritis	14	0.3
Acute on Chronic Pancreatitis	7	0.2
Renal		
Nephrotic syndrome with different forms	171	4.0
UTI	112	2.6
Acute glomerulonephritis	25	0.6
Haemato-oncology		
Thalassemia 242	5.6	
Iron deficiency anaemia	13	3.0
Acute lymphoblastic leukaemia	10	0.2
Aplastic Anaemia	8	0.2
Immune Thrombocytopenic Purpura	7	0.2
Haemophilia	7	0.2
Auto-Immune hemolytic anaemia	4	0.09
Nervous system		
Febrile seizure	330	7.6
Meningitis	92	2.1

Diseases	Number (N)	Frequency (%)
Cerebral palsy with complication	80	1.8
Epilepsy	29	0.7
Encephalitis	25	0.7
Acute Stroke Syndrome	8	0.2
Infectious		
Dengue fever with different stages	470	2.1
Enteric fever	324	7.5
Septicemia	83	1.8
Tubercular Lymphadenitis	7	0.2
Accidents & poisoning		
Chemical poisoning	208	4.8
Drowning	15	0.3
Kerosine poisoning	12	0.3
Drowning	8	0.2
Rheumatology		
Septic arthritis	13	0.3
Jia with different types	5	0.1
Reactive arthritis	2	0.04
Endocrine		
Congenital hypothyroidism	6	0.14
Rickets	4	0.09
Cushing syndrome	2	0.04
Genetics		
Down syndrome	14	0.3
Hurler syndrome	4	0.1
Skin		
Urticaria	23	0.5
Impetigo	8	0.18
cellulitis	6	0.14
Others		
Leukodystrophy	3	0.07
Brain Tumor	3	0.07
Gullein Barre Syndrome	3	0.07
Duchenne Muscular Dystrophy	3	0.07
Spinal Muscular Atrophy	2	0.05
Marfan Syndrome	1	0.02
Cystic Fibrosis 1	0.02	
Tubercular Splenic Abscess	1	0.02

Respiratory disease were predominant. Seasonal variation were noted in some diseases Like Asthma, bronchiolitis and Acute watery diarrhoea (AWD). AWD was more in March-May and another peak in September-December. Respiratory illness were also had two peak. One in February-April, another October-December. Although it was not a COVID dedicated hospital by Government, respiratory illness and gastrointestinal symptoms were also found to be associated with COVID-19. 1.8% were later diagnosed as COVID-19 patient, of which 48 were male and 30 were female (Fig-3).

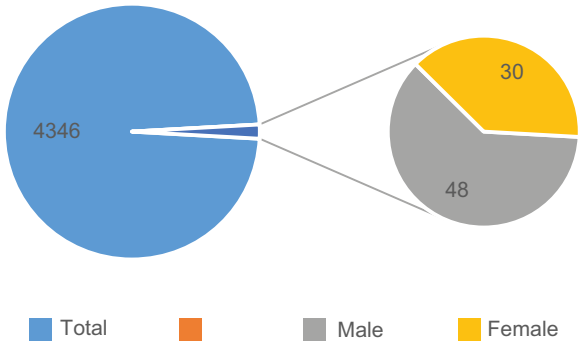

Fig-3: *Number and Gender variation in COVID-19 patients.*

Top ten diseases has been illustrated in Fig-IV. Where it shows, Bronchopneumonia is predominant cause of admission followed by Dengue. Dengue presented with different stages like as hemorrhagic, dengue shock syndrome. All are summated as one.

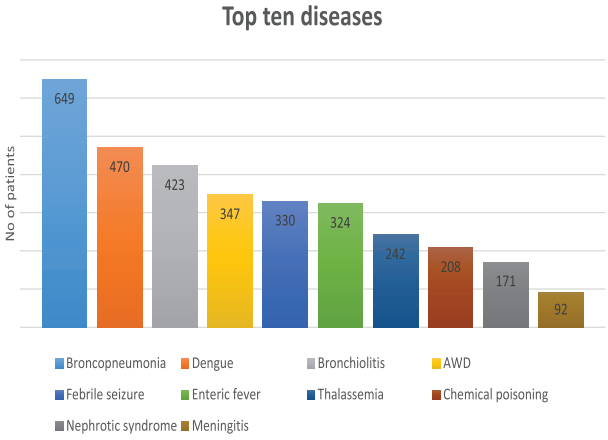

Fig-4: *Top Ten diseases among admitted patients.*

70% patients needed hospitalization for less than 7 days. Only 7% need hospitalization for more than 14 days (Fig-5).

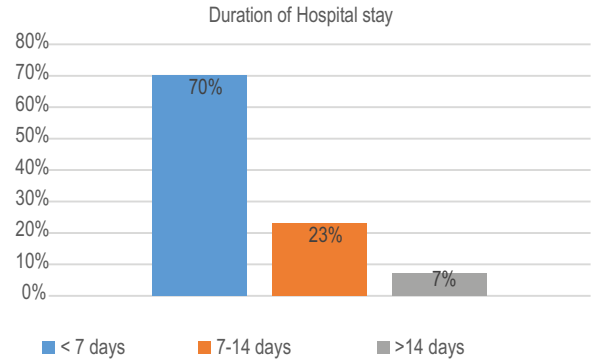

Fig-5: *Duration of hospital stay.*

Total number of allocated bed is 60 in number where 54 is free bed and 6 is paying. But, every bed is always remain overloaded and in end of each month it has been seen to be over occupied (Fig-6). Bed Turn over (BTR) rate is 72.4 patients/bed/year. Total Inpatient days were 30,442 days. Bed Occupancy rate (BOR) is 138%.

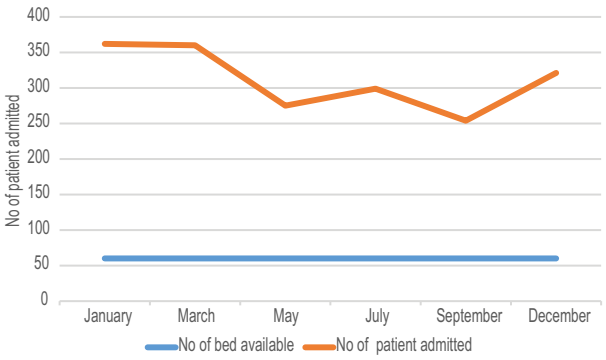

Fig-6: *Patient admitted against allocated bed*

Among the hospitalized patients, 84% were discharged with advice followed by 9% were discharged on request (DOR), 3.4% left hospital against medical advice (LAMA) and 2% patients were referred to other hospital. Majority of referral was due to diagnosis as COVID-19 which was 1.8% (78 patients) although initially admitted as suspicion of other disease. Mortality was 1.6% in this study (Fig-7).

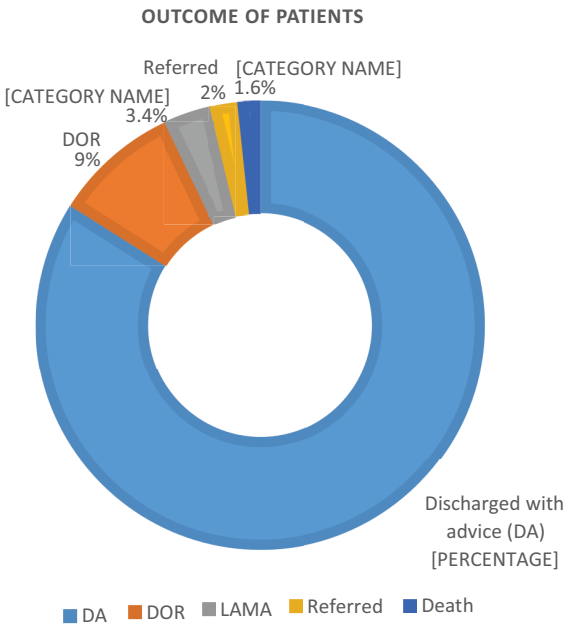

Fig.-7: *Outcome of admitted patients.*

Discussion:

Although being in COVID-19 era, lockdown, fear of being infected in hospital 4346 patients were admitted in one year in this tertiary hospital. Due to its unique location, well established reputation a huge number of patients got admitted here.

Among admitted cases, 68% were male. Male-female ratio is 2.1:1. This male predominance is also seen in other studies in Bangladesh and abroad [11,12]. This gender bias may be due to more male dominance health seeking behavior in this subcontinent.

Among all admission, 80.09% were from under five age group. This is similar to a study done in India by Chaturvedi et al[13]. Most of the admission occurred due to acute condition, which leads to cure and discharge mostly by 7 days. A lot of variation in admission has been seen in this year. Among which respiratory illness reached for most admission cases, Bronchopneumonia being top of all admission. This findings is similar to other studies done in Bangladesh[12,13]. Pneumonia is the 2nd largest infectious disease of morbidity and mortality affecting children but death are highest in south asia.[14] Respiratory illness had two peak of admission which is also similar to other study.[15] A little variation is also seen from study done by Alam et al[16]. They said AWD is top of all admissions as they don't have any ORT corner, so all diarrhoeal cases got admitted leading to top admission. But, our finding is different from other countries globally like Nepal[17]. African countries show infectious diseases being top of all hospital admission cases[18]. However, our most of top 10 diseases are infectious one. Dengue with different stages have been 2nd top admission in 2021 in this hsopital. In 2021, according to Director General of Health Services (DGHS) at least, 105 people died and 28,429 people were hospitalized with Dengue which is 2nd highest death and hospitalization after 2000[19].

The incidence and prevalence of febrile seizure has been increasing partly may be due to more awareness of parents and more viral infection in this season.[20] The prevalence of febrile seizures among different communities is between 2-4%, but was as high as 9% in Japan and 15% in Mariana Island.[21] In our study, it also became one of top admission (7.6%). In South Asia, the incidence of enteric fever was 394.2 episodes per 100,000 person-years [22] and in Bangladesh, the incidence of typhoid fever was reported to be 200 episodes per 100,000 person-years during 2003–2004 [23]. Two community-based studies that were conducted in the Kamalapur area of Dhaka during 2000–2001 and 2003–2004 reported that the blood culture positivity rates in febrile patients for enteric fever was 7.3%.[24] A higher rate (9%) of blood culture positivity for enteric fever was reported by a tertiary hospital–based study during 2008–2013 in Dhaka.[25] Another study at a private diagnostic center observed a similar rate (10%) of blood culture positivity for enteric fever during 1998–1999[26]. In our study, 7.5% admission were also due to enteric fever. Khan et al. studied on Bangladeshi school children and stated a high prevalence of Thalassemia in our country than assumed.[27] In our study, 5.6% admission were due to thalassemia. However, 1st time diagnosis and repeated admission for blood transfusion were not differentiated due to lack of data. We added Organophosphorus (OPC) poisoning, other unknown insecticides, pesticides, medicine under chemical poisoning. Maximum cases were accidental which is similar to findings of other study.[28] In our study, 4.8% admission were due to chemical poisoning followed by kerosene poisoning and drowning which is similar to other study done

in home and abroad. [28,29] Studies found higher incidence of nephrotic syndrome in children. 2-7 new cases per 100,000 children below 18 years of age of which 50% in between 1-4 years of age.[30] In our study, 3.9% admission was from nephrotic syndrome. However, it includes not only initial attack, but all type of nephrotic syndrome and also relapse cases were included. Meningitis leads to 2.1% admission in this hospital. Cases were confirmed by either clinical assessment or CSF findings ± Culture. Studies found higher incidence of meningitis among children between 1-59 months with vaccine preventable bacteria causing a substantial proportion.[31]

In our study, Bed Occupancy rate (BOR) is 138% with Bed Turnover rate (BTR) 72.4 patients/bed/year. Our observed BOR is much higher than that of THC[32] and tertiary care hospital in Dhaka.[9] Study found, the teaching hospital exhibited high level of inefficiency in the utilization of hospital beds.[8] However, this finding is just opposite of our finding. Only 60 beds are allocated for paediatrics but every beds are been shared, even flooring were done. Although SSMCMH was designated as non COVID hospital, 1.8% patient later diagnosed as COVID-19 patient and referred to COVID dedicated hospital. A wide range of presentation often made it difficult to diagnose COVID-19 at initial presentation. In our study, Mortality rate is 1.6% which is much lower than other study found home and abroad. A study done in Nigeria found overall pediatric mortality rate is 2.8%[11]. Whereas, Hasan et al found 4.9% mortality in children in a tertiary care hospital in Chittagong[15]. Authors have found several factor of this higher incidence of mortality rate.

Conclusion:

In conclusion, this findings have increased understanding of paediatric admission trends and scenario of over burden of this institution. For effective case management, strengthening hospital planning and health sector development it is essential to evaluate the admission pattern and assessment of hospital performance. This findings will further add to strength community based programs and to achieve SDG 3 goal by 2030.

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