Nature and Severity of Acute Medical Pediatric Admissions in One Year

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Objective: The aim of this study is to evaluate the nature and the severity of acute pediatric medical illnesses admitted to the general pediatric ward.

Design: A Retrospective Study.

Setting: Pediatric Department, King Hamad University Hospital, Bahrain.

Method: The discharged diagnoses of all acute medical pediatric admissions to the pediatric ward from 1 January 2015 to 31 December 2015 were reviewed. The following were documented: age, nationality, diagnosis, infective agent where possible, and the duration of admission.

A retrospective diagnosis of probable pneumonia was made; on the finding of a definite patch of consolidation on chest x-ray.

Result: The number of children who attended the ED department from 1 January 2015 to 31 December 2015 was 11,512; 1,153 (10%) were admitted. Of those admitted, 838 were medical admissions, of whom 453 (54%) were of Bahrain nationality. The mean age of the children was 2.8 years, ranging from 1 day to 14 years. The average length of stay (LOS) was 3.9 days. Ninety (10.8%) admissions were documented to affect the upper respiratory tract; 52 (6.2%) were upper respiratory tract infections, 29 (3.5%) were tonsillitis and nine (1.07%) were croup. Ninety (10.8%) gastrointestinal conditions were admitted. Eighty-eight (10.5%) of the admitted cases were seizures. Five hundred seventy (68%) cases were diagnosed with infection; of which, 86 (15%) were classified as serious, consisted of pneumonia, urinary tract infection (UTI), and bacteremia. Ninety-one (10.9%) children (mean age 2.6 months, range 1 month-13 years) required admission to HDU/ITU.

Conclusion: Viral like infections was a common cause of admission. We found a large number of children with pneumonia, especially during the winter months.

The study gives insight into the acute challenges pediatric trainees face as front-line clinicians in their care for children with acute pediatric conditions.

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All acute pediatric cases were initially assessed and stabilized by the Emergency Department (ED) team. The majority (approximately 89%), after close observation (up to 8 hours) were discharged, while those in need of further medical or surgical inpatient care were admitted to the pediatric ward, high dependency unit (HDU) or intensive therapy unit (ITU).

The majority of pediatric admissions are due to uncomplicated viral infections[1]. Only 5-15% will require a period of high dependency (HDU) or intensive care (ITU)[2,3,4].

Despite that, the immunization programs have dramatically reduced the incidence of life-threatening infections such as epiglottitis, meningitis, septicemia, and septic arthritis[5,6,7]; serious bacterial infections still present in up to 27% of patients[5-9].

The initial management of the febrile child often includes the empirical use of antibiotics, which is attributed to its availability (e.g. without a prescription), which can lead to the emergence of multidrug-resistant organisms[10].

In Bahrain, approximately 50% of the population is made up of foreign nationalities, who frequently travel back and forth visiting their country of origin, which could result in the unintentional importation of serious infections such as malaria and tuberculosis[11-13].

The aim of this study is to evaluate the nature and the severity of acute pediatric medical illnesses admitted to the general pediatric ward.

METHOD

The discharged diagnoses of all the acute medical pediatric admissions to the pediatric ward from 1 January 2015 to 31 December 2015 were reviewed. The following were documented: age, nationality, diagnosis, infective agent, and the duration of admission.

Making a definitive diagnosis of pneumonia clinically is difficult, due to the non-specificity of clinical signs, together with difficulties in the interpretation of x-ray changes[14,15].

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Although consolidation on a chest x-ray is recognized as representative of pneumonic change, difficulties with interpreting what constitutes significant consolidation are not easy[16,17]. A retrospective diagnosis of probable pneumonia was made based on the finding of a definite patch of consolidation on chest x-ray, as confirmed by a consultant pediatrician and a senior registrar in radiology; we used this terminology, which has been used in another study[18].

RESULT

The number of children who attended the ED department from 1 January 2015 to 31 December 2015 was 11,512; 1,153 were admitted. Of those admitted, 838 were medical admissions; of whom, 453 (54%) were of Bahrain nationality. The other nationalities were predominately from India and Pakistan, with some from Jordan, Egypt and Yemen. The mean age of the children was 2.8 years, ranging from 1 day to 14 years; 226 (27%) were aged under 6 months, 302 (36%) were under 1 year, 434 (51.8%) were under 2 years, 511 (61%) were under 3 years, 573 (68.4%) were under 4 years, and 632 (75.4%) were under 5 years, see figure 1. The average length of stay (LOS) was 3.9 days, 155 (18.5%) cases stayed for 1 day, 218 (26%) stayed for 2 days, and 302 (36%) stayed for 3 days.

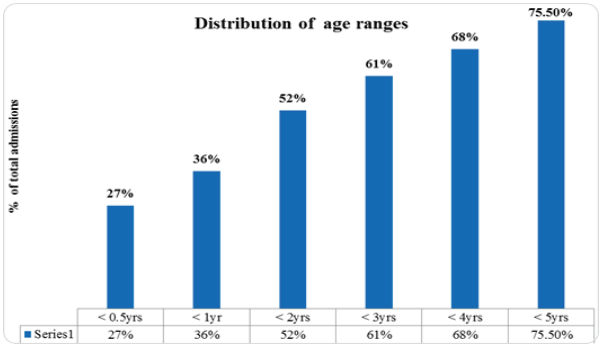

Figure 1: Graph Showing the Age Range Distribution

One hundred eighty-nine (22.6%) conditions were documented to affect the lower respiratory tract, in which they were the most common causes of admission; 90 (10.7%) were lower respiratory tract infections, 52 (6.2%) were bronchiolitis, 27 (3.2%) were asthma and 20 (2.4%) were hyperactive airway disease. Ninety (10.8%) admissions were documented to affect the upper respiratory tract; 52 (6.2%) were upper respiratory tract infections, 29 (3.5%) were tonsillitis and nine (1.07%) were croup.

Ninety (10.8%) gastrointestinal conditions were admitted; 78 (9.3%) were comprised of vomiting and diarrheal infections which accounted for the majority.

Eighty-eight (10.5%) of the admitted cases were seizures; of which, 48 (5.7%) were febrile seizures while 40 (4.8%) were non-febrile. Seventy-nine (9.4%) admitted cases were neonatal jaundice requiring phototherapy.

The 302 (36%) of the admitted cases were diabetes, congenital and acquired heart disease, accidental ingestion, skin infections, vasculitis, hematological conditions including leukemia, and neurological conditions such as encephalitis and Guillen Barre syndrome.

Twenty-two (2.6%) admitted for prevalent conditions in populations of the Middle East and Asia; 5 (0.5%) with sickle cell crises, 3 (0.3%) acute hemolytic anaemia secondary to G6PD (outside the neonatal period), 3 (0.3%) beta thalassemia major, 2 (0.2%) with amoebiasis, 1 (0.1%) acute episode of Familial Mediterranean fever, and 1 (0.1%) malaria (Plasmodium vivax).

Five hundred seventy (68%) cases were diagnosed with infection; of which, 86 (10.3%) were classified as serious, consisted of pneumonia, urinary tract infection (UTI), and bacteremia, see figure 2. There were two (0.2%) admissions treated for presumed bacterial meningitis, and one (0.1%) admission for malaria, see figure 2.

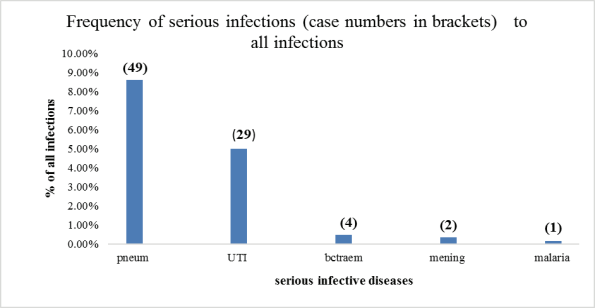

Figure 2: Frequency and Distribution of Serious Infections

The most common serious disease was pneumonia 49 (5.8%), affecting generally the younger age group (mean age 25.9 months, mode 24 months, range 1 month – 13 years), with a mean length of stay of 6 days (range 1-30 days). Most of the pneumonia cases were admitted in the winter months, see figure 3.

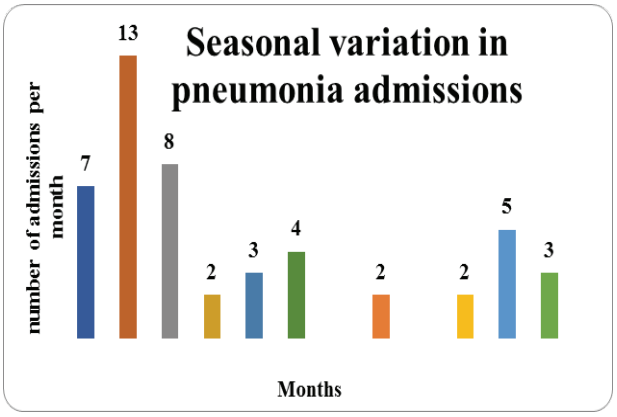

Figure 3: Seasonal Variation in Pneumonia Admissions (for months of July and Septmber, 0 pneumonia admissions)

Among 200 (35%) of the admitted cases with suspected infection, antibiotic treatment had been initiated before attending the hospital.

Methicillin-resistant Staphylococcus aureus (MRSA) was grown from one sample of pleural effusion and from 7 (0.8%) from skin swabs; extended spectrum beta-lactamase E.coli (ESBL E.coli) was grown from 11 (1.3%) urine samples and 1 (0.1%) umbilical skin swab; Plasmodium Vivax was present in one (0.1%) peripheral blood film. In addition, 3 (0.3%) blood cultures were positive; one (0.1%) cultured salmonella, one (0.1%) cultured strep pneumonia, and one (0.1%) cultured Pseudomonas aeruginosa. One (0.1%) stool sample was cultured with salmonella. Entamoeba histolytica cysts were found in two (0.2%) children treated for amoebiasis. However,

samples of cerebrospinal fluid did not grow any organisms. There were no admissions for tuberculosis over that year.

Ninety-one (10.9%) children (mean age 2.6 months, range 1month-13years) required admission to HDU/ITU, see table 1. Twenty-seven (3.2%) patients were less than 6 months old and 78 (9.3%) were less than 5 years. Of the 91 (10.9%) children, 33 (3.9%) cases of respiratory failure accounted for the majority of HDU/ITU admission; of which, 21 (2.5%) cases occurred between November and February (winter season). On the other hand, 36 (4.2%) patients of the total cohort required artificial ventilation.

Table 1: Admission Diagnoses to PICU/HDU from January 2015 – December 2015 and January 2016

Diagnosis	Number of cases (91)	Percentage of total admissions PICU/ HDU
Respiratory failure	33	3.9%
Status epilepticus	20	2.4%
Surgical cases	11	1.3%
DKA	7	0.8%
Cardiac	5	0.5%
Septic shock	5	0.5%
Near drowning	4	0.4%
Post arrest	3	0.3%
Renal failure	2	0.2%
Drug ingestion	1	0.1%
Total	**91**	**10.8%**

DISCUSSION

The spectrum of diseases in our study is similar to other studies, with the majority of admissions due to infection, most frequently affecting the respiratory tract[1,18-24,25,26].

The distribution of age range involved is similar to other studies; patients <1 year comprising the largest number of admissions, and the majority of the admissions being <3 years old[19,27,28]. The under 1-year-old age group is the most susceptible to invasive bacterial disease[5,25]. Infection leads to a further decrease in airway caliber resulting in increased airway resistance and respiratory distress[29,30].

Although the majority of pediatric febrile illnesses are secondary to viral infection, early clinical detection of those with serious bacterial disease has always been challenging to the clinician, especially with regard to the under 1-year-olds[18,19,31,32]. The value of laboratory tests such as white cell count (WCC) and C- reactive protein (CRP) are limited in detecting serious illness in a child early[1,9,33-36].

The average length of stay (3.9 days) in our population was longer than those in other studies (mean 1.8 days); this may be a reflection of the different health care systems[19,37]. Parental anxiety towards fever has been recognized in other studies, which might discourage parents from leaving the hospital to continue the care for their young child at home [19,24,38,39].

Effective immunization program against the main bacterial organisms (Haemophilus Influenzae, Neisseria Meningitis, and Streptococcus Pneumonia) has led to dramatic falls in life-threatening infections[5-7].

The introduction of the pneumococcal vaccine has resulted in a fall in the admission rates for pneumonia. The urinary tract infections are now reported as the leading cause of serious bacterial disease[6,22,25,26].

In our study, the majority of our admissions were diagnosed as infective, and a minority of which had a serious infective disease. Our low rate of bacteremia is similar to other studies; however, pneumonia, as opposed to urinary tract infections, was the commonest serious illness[22,25]. A recent study from the Middle East showed a similar pattern of serious illness[1].

Pneumonia was most common during the winter months when the younger age groups are at risk. This age group although protected by immunization against the main bacterial pathogens for pneumonia is still at risk of viral causes such as RSV, adenovirus, parainfluenza and influenza[14,40]. These viruses were recognized as causing equally as severe pneumonia as bacterial agents[41]. In our study, we are unable to determine the infective pneumonic agent[42,43,44]. In our study, pneumonia remains the leading cause of mortality in the under 5 years old age group[45].

Infection and respiratory diseases are the most common reasons for hospital admission, and for the 5-15% of all pediatric admissions to HDU/PICU[3,4,46].

Our data revealed that nearly 36 (40%) of the 91 admissions to ITU/HDU needed ventilation. This is less than reported from other centers (showing rates of up to 66%) and may reflect different clinical practices, such as high thresholds for ITU/ HDU admission[3].

The misuse of antibiotics linked to the emergence of multidrug-resistant organisms is recognized as one of the most challenging threats to public health organization[10].

CONCLUSION

Viral-like infections play a predominant cause of admission. We found a large number of children with pneumonia, especially during the winter months.

The study gives insight into the acute challenges pediatric trainees face as front-line clinicians, in their care for children with acute pediatric conditions.

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