

# Pattern of Infection in Patients Admitted to 17th Shahrivar Children's Hospital

Kobra Boloky Moghaddam<sup>1</sup>, Houman Hashemian<sup>1</sup>, Zahra Atrkar Roshan<sup>1</sup>, Majid Asgharzadeh<sup>1</sup>, Afagh Hassanzadeh Rad<sup>1</sup>, Setila Dalili<sup>1,\*</sup>

<sup>1</sup>Pediatrics Growth Disorders Research Center, School of Medicine, Guilan University of Medical Sciences, Rasht, IR Iran

\*Corresponding author: Setila Dalili, Pediatrics Growth Disorders Research Center, School of Medicine, Guilan University of Medical Sciences, Rasht, IR Iran. Tel: +98-1313229902, Fax: +98-1313226101, E-mail: Setiladalili1346@yahoo.com.

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**Background:** Infectious diseases are important causes of mortality and morbidity in children and have been a particular concern in pediatrics' wards. Although, infectious disease are important components of population health in high-income nations, but are often overlooked. The recognition of the factors and infectious agent subtypes could help to prevent further interventions. Up to now, there are limited investigations regarding this important issue.

**Objectives:** We aimed to investigate the pattern of infection in patients admitted to 17th Shahrivar Children's Hospital.

**Patients and Methods:** This is a descriptive cross-sectional study which was conducted in 17th Shahrivar Children's Hospital during August 2008-August 2009. Participants comprised of children aged 1 month to 14 years, who admitted to the hospital. Samples were collected by simple sampling and data were collected by a form including the age, gender, place of inhabitants, season of admission, duration of hospitalization and final diagnosis. Descriptive statistics such as mean, standard deviation, frequency, the maximum and minimum of data were used to analyze the results using SPSS version 16 software.

**Results:** During the study, 4676 children, aged 1 month to 14 years were admitted and 29% (1357) of them were diagnosed with infectious disorders, 1127 infected patients (83.2%) were younger than 5 years. Results demonstrated that the infectious diseases were more frequent in male, winter and residents from urban area. Also, Respiratory tract and gastrointestinal infections had been diagnosed in 40.1% and 37.2% of cases, respectively.

**Conclusions:** Since, there are few relevant studies in our country, recent studies on infectious diseases could be used for national planning and medical requirements' preparation, it seems that periodical assessments of these diseases are mandatory.

**Keywords:** Admission Pattern; Children; Infectious Diseases

## 1. Background

Infectious diseases are important causes of mortality and morbidity in children and are the particular concerns in pediatrics wards (1, 2). In 1998, 54 million deaths reported worldwide from which one third was caused by infectious diseases among children in developing countries (3). The severity of infection depends on various factors, including the virulence of the strain of infectious organism, available treatment modalities, the immune response of the infected host, which might be reduced by famine or diseases and social factors such as contaminated water supply (4).

Epidemiological surveillance plays an important role in infection control and provides information about the incidence of certain infections and their pattern of occurrence, as well as highlighting any unusual clusters of such diseases. Also, timely and appropriate intervention can prevent or control any outbreaks (5). Previous studies reported the acute respiratory infections as the lead-

ing cause of acute illnesses and young children mortality, worldwide (6). Also, in a study in South region of Iran, seizure disorder, pneumonia and gastroenteritis were the most common diseases and congenital heart disease, sepsis and pneumonia were the most common diseases leading to death (7).

Although, controlling infectious disease is an important factor of population health in high-income nations, but it is often overlooked. Moreover they induce school and work absenteeism, reduce productivity and substantial health care expenditures and also shape the biological and health risks and may be causally linked to higher risk of chronic diseases in life (8).

## 2. Objectives

Therefore, the recognition of the factors and infection subtypes could help to prevent further interventions, since limited investigations on this important issue and

### Implication for health policy/practice/research/medical education:

Infectious diseases are important causes of mortality and morbidity in children and have been an issue of particular concern in pediatrics departments. Since, recent studies on infectious diseases are used for national programming, and preparation of equipment and medical requirements, it seems that periodical assessments of these diseases are mandatory.

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few relevant studies in our country are available, we aimed to investigate the pattern of infection disorders in patients admitted to 17th Shahrivar Children's Hospital in north part of Iran, Rasht.

### 3. Patients and Methods

This is a descriptive cross-sectional study conducted in 17th Shahrivar Children's Hospital during August 2008- August 2009. Participants comprised of children aged 1 month to 14 years, admitted to the infectious diseases, internal medicine (endocrinology, immunology, asthma and allergy wards), emergency, gastroenteritis, neurology, pediatric intensive care unit (PICU) and hematology wards.

Consent letters obtained and the samples were collected by simple sampling. Data were collected using a form including age, sex, place of inhabitants, season of admission, duration of hospitalization, final diagnosis and the clinical outcomes. Patients' clinical status and records including the laboratory results and radiological findings were assessed daily and final diagnosis including respiratory tract, gastrointestinal, systemic, urinary tract, CNS, skin, bone, joint and musculoskeletal infections was confirmed by a trained expert. Also, acute watery and bloody diarrheas were diagnosed based on clinical signs. Descriptive statistics such as mean, standard deviation, frequency, the maximum and minimum of data were

used to analyze the results using SPSS version 16 software.

### 4. Results

During the study, 4676 children, aged 1 month to 14 years were admitted to the infectious diseases, internal medicine, emergency, gastroenteritis, neurology, pediatric intensive care unit (PICU) and hematology wards of the hospital.

The mean age of patients with infectious disease was  $32.9 \pm 32.6$  months. As shown in Table 1, the results demonstrated that infectious diseases were more frequent in male, winter and urban residents (Table 1).

In this study, 29% (1357) of the admitted patients (one in four of total admissions), reported infectious diseases, and 42.6% of these participants were female and 57.4% were male. Also, 1127 of infected patients (83.2%) were children younger than 5 years old. The mean duration of hospitalization was  $5 \pm 4.6$  days. The minimum and maximum duration of hospitalization were 1 and 55 days, respectively. Respiratory tract and gastrointestinal infections showed the highest frequencies which were 40.1% and 37.2%, respectively.

Bacterial pneumonia was the most frequent infection among respiratory tract infections (30.1%).

Table 2 demonstrated the final diagnosis and their subtypes of the hospitalized patients with infectious disorders.

**Table 1.** Distribution of Demographic Characteristics of the Hospitalized Patients With Infectious Diseases

Characteristics	No.	%
<b>Age, y</b>		
< 5	1127	83.05
≥ 5	230	16.95
<b>Gender</b>		
Female	578	42.6
Male	779	57.4
<b>Season</b>		
Autumn	310	22.8
Winter	421	31.1
Spring	311	22.9
Summer	311	22.9
<b>Place of inhabitants</b>		
Urban	880477	64.8
Rural		35.2

**Table 2.** Final Diagnosis and Their Subtypes of the Hospitalized Patients With Infectious Disorders

Infections	No.	%
<b>Respiratory tract infections</b>	544	40.1
<b>Bacterial pneumonia</b>	164	30.1
<b>Viral upper respiratory infections</b>	72	13.2
<b>Acute bacterial sinusitis</b>	46	8.45
<b>Bronchiolitis</b>	33	6.1
<b>Sinobronchitis</b>	32	5.9
<b>Viral pneumonia</b>	31	5.6
<b>Laryngotracheo bronchitis</b>	22	4
<b>Aspiration pneumonia</b>	21	3.8
<b>Influenza</b>	19	3.4
<b>Pneumonia without fever</b>	17	3.1
<b>Bronchopneumonia</b>	16	2.9
<b>Mumps</b>	14	2.5
<b>Infectious mononucleosis</b>	12	2.2
<b>Pharyngotonsillitis</b>	5	0.9
<b>Empyema</b>	4	0.7
<b>Others</b>	36	6.6
<b>Gastrointestinal</b>	505	37.2
<b>Acute bloody diarrhea</b>	250	49.5
<b>Acute watery diarrhea</b>	243	48.1
<b>Hepatitis A</b>	7	1.4
<b>Amebiasis</b>	3	0.5
<b>Hepatitis B</b>	1	0.2
<b>Candidial esophagitis</b>	1	0.2
<b>Systemic</b>	136	10
<b>FWLS<sup>a</sup></b>	79	58.1
<b>Sepsis</b>	29	21.4
<b>Fever and Neutropenia</b>	13	9.6
<b>Fever and rash</b>	5	3.7
<b>Typhoid fever</b>	4	2.9
<b>FUO<sup>a</sup></b>	3	2.2
<b>Brucellosis</b>	1	0.7
<b>Toxic shock syndrome</b>	1	0.7
<b>Kala-azar</b>	1	0.7
<b>Urinary tract</b>	58	4.3
<b>Lower urinary tract infection</b>	58	100
<b>CNS<sup>a</sup></b>	52	3.8
<b>Bacterial meningitis</b>	22	42.3
<b>Viral Meningoencephalitis</b>	18	34.6
<b>Encephalitis</b>	5	9.6
<b>Cerebral abscess</b>	2	3.9
<b>Cerebelitis followed by varicella</b>	5	9.6
<b>Skin</b>	25	1.8
<b>Bone, joint and musculoskeletal</b>	16	1.2
<b>Infectious arthritis</b>	10	62.5
<b>Muscular abscess</b>	6	37.5
<b>Others</b>	21	1.6
<b>Roseola infantum</b>	14	66.6
<b>Lymphadenitis</b>	4	19
<b>Peri-anal abscess</b>	1	4.8
<b>Bacterial peritonitis</b>	1	4.8
<b>Infectious Endocarditis</b>	1	4.8

<sup>a</sup> Abbreviations: CNS, central nervous system; FUO, fever of unknown origin; FWLS, fever without localizing signs.

## 5. Discussion

In this study, 29% of total hospitalizations were caused by the infectious diseases whereas Najib et al. (7) and Habibinejad et al. (9, 10) have reported this rate as 21.3% and 42% in southern and central parts of Iran, respectively. It seems that this difference is due to different age groups assessed in these studies. In this study and the study by Najib et al. the investigators considered children older than 1 month but the study of Habibinejad et al. revealed their results even for the neonates.

Although, during 1980 and 2000, there was dramatic increase in the percentage of children immunized in developing countries, however immunizations for diseases such as hepatitis (except type B), *Hemophilus influenza* and varicella are rarely reported in developing world (11).

In this study, respiratory tract infections (RTI), gastrointestinal and systemic infections were the most frequent infections. We mentioned that acute bloody and acute watery diarrheas were the frequent subtypes of infections in participants, respectively and bacterial pneumonia was the leading cause of RTI. Whereas, Habibinejad et al. showed that gastroenteritis, pneumonia and urinary tract infections were the most frequent infections in pediatrics' wards, respectively. Furthermore, acute respiratory tract (ARI) is the leading cause of morbidity and mortality in both developing and developed countries (12). WHO recognized respiratory diseases as the second important cause of death for children under five years old in 2010 and stated that pneumonia is one of the main three causes for newborn mortality (13).

According to Sawadkoohi et al. 10% of hospitalized patients had pneumonia which was consistent with our results that reported pneumonia in 14% of the admitted patients. However, our results demonstrated that pneumonia was classified in to bacterial and viral types which indicated 85% and 15% as their frequency, respectively. However, Sawadkoohi et al. revealed completely different results. They mentioned that nonbacterial pneumonia had higher frequency (79%) compared with bacterial type (21%). This difference may recommended other related factors such as allergy and asthma in that zone (14).

In this study, the results showed that the frequency of infectious diseases was higher in winter (31.1%) and lower frequencies were reported in the other seasons. However, in a previous study in this hospital (1996), the highest and lowest frequencies of infectious diseases were respectively reported in spring (20%) and winter (13%) which was inconsistent with the current results. It seems that this inconsistent result is related to the high prevalence of mumps in spring which is limited by MMR vaccination from 2003.

Also, the results demonstrated that among neurological infections, bacterial meningitis (42.3%) and viral meningoencephalitis (34.6%) were respectively the most frequent infectious diseases. However, in 1996, mump

meningoencephalitis was the most frequent neurological infectious disease (13.7%). In addition, in a study by Ghasemi et al. which investigated the frequency of meningitis in 1996-1998, 56.2% viral meningitis and 37% bacterial meningitis had been reported. However, in this study the results showed that viral meningoencephalitis occurred only in 1.3% of inpatients which could be as a result of MMR vaccination (15).

Also, results showed that residents from urban area encountered more with infectious diseases (64.8%) which could be as a result of higher population and more convenient access to the hospital. Since, recent studies regarding to infectious diseases could be used for national planning, and medical requirements' preparation it seems that periodical assessments of the infectious diseases are mandatory.

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