Acta Scientific PAEDIATRICS (ISSN: 2581-883X)

Volume 9 Issue 1 January 2026

Research Article

Predicting Factors of Bronchiolitis in Children Admitted to P. I.C.U At the Jala Children's Hospital, Tripoli, Libya

Marwa EL Hashemi Sasi[1]*, Faraj Abdussalam Ahamed[2] and Aisha Areaby Sehri[3]

[1]*University Hospital, Tripoli, Libya*

[2]*Consultant Pediatrician, University Hospital, Tripoli, Libya*

[3]*Faculty of Medicine, University of Tripoli, Tripoli, Libya*

***Corresponding Author:** Marwa EL Hashemi Sasi, University Hospital, Tripoli, Libya.

Received: October 23, 2025

Published: December 10, 2025

Abstract

Introduction: Bronchiolitis is a common lower respiratory tract infection among young children during their first 2 years of life, usually caused by viral etiology, with high morbidity, hospital admissions, healthcare costs, but low mortality.

Aim of study: To know the predictors of admission of patients with bronchiolitis to the Intensive Care Unit (ICU).

Methods: A retrospective study reviewed all identified children's files diagnosis as bronchiolitis from 1st October 2018 to 31th March of 2019 at the Jala Children's Hospital, Tripoli, Libya, using a structured questionnaire were assessed patient's demographic characteristics, clinical and laboratory data. Regular usual word versus ICU admissions were compared.

Results: Ninety patients were identified. The median age was 62.5 days (IQR 45-120 days), 62.2% were male, and 60% were admitted to regular ward and 40% were in ICU. The characteristics of ICU admission were as followed; formula feeding (72.2% vs. 22.2%); (p = 0.015), rapid respiratory rate (65.5 ± 6.78VS 55. 53.5+7.75 breaths/min; p = 0.000), low oxygen saturation SPO2 (86.6 ± 5.98VS 93.1 ± 3.71; p = 0.012). Other factors like age, gender, family history of asthma, eczema, birth weight, heart rate, and chest X-ray findings were not significantly associated with P.ICU admission.

Conclusion: The predictors factors of P.I.C.U admission were: formula feeding, respiratory rate, and room air oxygen saturation. There is a dire need for guidelines and protocol for ICU admission in the emergency department of our hospital.

Keywords: Bronchiolitis; Children; Morbidity

Introduction

Respiratory tract infections (RTI) is caused by an infection in any part of the respiratory tract from the upper to the lower tract [1]. Bronchiolitis is a common lower respiratory tract infection among young children during their first 2 years of life caused usually by viral etiology, with high morbidity, hospital admissions, healthcare costs, but low mortality [2,3]. Although the term "bronchiolitis" indicates bronchiole inflammation, the condition is diagnosed clinically, and the best accurate description for the disease is still debated [4]. There is no uniform definition of bronchiolitis, and no definite age limit. In Europe, wheezing is regarded as a less important finding in children under 2 years of age. During recent years, several studies from Europe and the USA have included children only up to12 months of age [2]. Approximately 20% of children develop bronchiolitis during their first year of life, and studies from the USA have found increasing rates of bronchiolitis (188/1000 infants in 1996/97 to 265/1000 in 2002/03) in this age group. In a Norwegian study, the mean annual hospitalization incidence for RSV bronchiolitis was 21.7 per 1000 for children below 12 months, and in a large study from England the admission rate for all infants with bronchiolitis below 12 months of age was 24.2 per 1000 [2]. Bronchiolitis is generally seasonal, appearing most frequently in epidemics during the winter months [2]. The most common virus is Human respiratory syncytial virus (RSV) [5], and it is, the same seasonal pattern is observed throughout the world, with most cases occurring from October until May on the northern hemisphere [2]. Despite the fact that bronchiolitis is a self-limiting illness, the prevalence of hospitalization has grown in the previous two decades, with 60% 70-of hospitalized infants with bronchiolitis [5,6], often require observation and supportive therapy [7].

However, approximately 2-6% requires admission to a pediatric intensive care unit (PICU), with 2-3% of hospitalizations requiring invasive mechanical ventilation [8], and about 60 thousand deaths per year worldwide in children under the age of 5yeras old [9].

Prematurity, younger age, environmental factors (e.g. passive smoking, crowded household) and presence of co-morbidities (e.g. chronic pulmonary disease, congenital heart disease, immunodeficiency, neurologic disease) are all-concomitant to a higher risk of severe bronchiolitis, according to epidemiological evidence [5,8].

Objectives of the study

- Identify the risk factors associated with outcome in children with a diagnosis of bronchiolitis admitted to PICU.
- Children admitted to PICU (ICU admission group) were compared to children admitted to regular usual word (ward admission group).

Study design and setting

The study was designed as retrospective, and carried out at the Jala Children's Hospital Tripoli, Libya. The study was all patients aged less than 2 years admitted with diagnosis of bronchiolitis. Study were conducted from 1st of November 2018 to 31st of March 2019.

Data collection

We reviewed all identified children's files to collect clinical data, using questionnaire, which included the following sections: assessed patient's demographics, and details of their acute illness as follow: Age in months, sex, any concomitant medical illnesses (congenital heart disease CHD, Cleft palate), birth weight, type of feeding, history of passive smoking, presence of cough, wheeze, duration of illness, inhaled ß2 agonist received, whether gave steroid, antibiotic, RR (respiratory rate), HR (heart rate), oxygen saturation (Spo2) at room air, chest X. rays (CXR), and finally whether admitted in regular usual ward or ICU.

Data management and analysis

The collected data were sorted, coded then entered and analyzed using the SPSS, version 25.0statistical software. Descriptive statistics were used to summarize the outcome variables. Appropriate inferential statistics (chi square test and t test) were performed with 0.05 chosen level of significance.

Results

The following parameters are compared between PICU and ward admission

Demographic characteristics and medical history

During their admittance to the Jala Children's Hospital in Tripoli, Libya, 90 children with a clinical diagnosis of bronchiolitis had their files reviewed. Fifty-four (60%) of these patients were admitted to a regular ward, while thirty-six (40%) were admitted to the PICU. Concerning age, (53.7%, 55.6%) were in age group less than three months who's admitted to intensive care unit and regular word respectively. The results revealed that there was not a significant relationship between them (p = 0.863).

The majority of patients 70.4 percent whose admitted in regular word were males and % 29.6ere females on contrary, PICU revealed those 50% males and 50% females. The results revealed that there was not a significant relationship between them (p = 0.053). The percentage of patients who had history of passive smoking, reached approximately %22.2 Ong whose admitted at PICU, compared to word admission were 35.2%. The results revealed that there was not a significant relationship between them (p = 0.189). A significantly larger proportion of patient whose admitted in regular word (%77.8) reported that they breast feeding compared with only 27.8 percent whose admitted in PICU. While larger proportion of patient whose admitted in PICU (72.2%) reported that they bottle feeding compared with only 22.2 percent whose admitted in regular word, (p = . 001).

About 53.7% of patients reported that their delivery was normal who has admitted in regular word, whereas, 46.3% their delivery was cesarean who has admitted to PICU. The results revealed that there was not a significant relationship between them (p = 0.54). Patients whose admitted in PICU are more weight than patient who those admitted in regular ward (mean birth weight 3.23 VS mean birth weight 3.07 respectively with on significant difference (p = 0.342) (Table 1).

Clinical presentation and clinical course

PICU admission group had an increased mean respiratory rate, and low mean oxygen saturation compared to word admission group (p values < 0.001). the common symptoms that motivated the children to be hospitalized were cough, which was cited by (98.1% of word admission group, 94.4% of PICU admission), with no sig-

Variable		L.C.U admission (n = 36)		Ward admission (n = 54)		p- value
		N	%	N	%	
Gender	Male	18	50.0%	38	70.40%	0.051[1]
	Female	18	50.0%	16	29.6%	
Age group	Less than 3 months	20	55.6%	29	53.7%	0.863[1]
	More than 3 months	16	44.4%	25	46.3%	
Type of feeding	Breast feeding	10	27.8%	42	77.8%	0.001[1]
	Breast feeding	26	72.2%	12	22.2%	
Type of delivery	Normal delivery	17	47.2%	29	53.7%	0.547[1]
	Cesarean section	19	52.8 5	25	46.3%	
H/of passive Smoking	Yes	8	22.2%	19	35.2%	0.189[1]
	No	28	77.8%	35	64.8%	
Maturity	Mature	30	83.3%	49	90.7%	0.293[2]
	Premature	6	16.7%	5	9.3%	
Birth weight in Kg (mean ± SD)		3.074 ± 0.815		3.230 ± 0.713		0.342[3]

Table 1: Distribution of demographic characteristic among patients according to word admission VS I.C.U admission (n = 90). The values were expressed as frequency, percentage. [1]: Chi square test. [2]- Fisher exact test. [3] Independent- sample T test. P < 0.05 is statistically significant.

nificant difference between them (p = 0.338), and wheezy chest, which was quoted by (96.3% of word admission group, 100% of PICU admission), with no significant difference between them (p = 0.243). Regarding steroid treatment, (100%, 94.4%) were treated with steroids intravenously when admitted to the Intensive care unit and regular word respectively. The results revealed that there was not a significant relationship between the two variables (p = 0.150).

With regard to steroid inhaled B2 agonist treatment, (100%, 94.4%) were treated by Inhaled B2 agonist intravenously in patients admitted to the Intensive care unit and regular word respectively. The results revealed that there was not a significant relationship between the two variables (p = 0.150). Concerning antibiotic treatment, (%96.3, %100) were treated with antibiotics intravenously after being admitted to the Intensive care unit and regular word respectively. (p = 0.150). The percentage of patients who had chest X ray normal reached approximately 72.2% among those admitted to the Intensive Care Unit, compared to abnormal findings of 27.8%. About 35.2% of patients reported that their chest X ray was abnormal when admitted on regular word. These results revealed that there was not a significant relationship between the two variables (P = 0.693) intensive care unit and regular word respectively. Concerning antibiotic treatment, (100%, 96.3%) were treated with antibiotics intravenously after being admitted to the Intensive care unit and regular word respectively (p value = 0.150). The percentage of patients who had chest X-ray normal reached approximately 72.2% among those admitted to the Intensive Care Unit, compared to abnormal findings of 27.8%. About 35.2% of patients reported that their chest X-ray was abnormal when admitted on regular word. These results revealed that there was not a significant relationship between the two variables (P = 0. 693).

Predictors of PICU admission as a measure of severity of bronchiolitis

Logistic regression analysis was performed to identify the determinants the factors associated with I.C.U admission among the study population. Bottle feeding was about six times as likely as breast feeding to admitted to intensive care unit (OR 6.0; 95% CI 1.425; 25.307-p = 0.015), (OR 1.17; 95% CI 1.082-1.285; p < 0.001% 1) increase of respiratory rate determine increase of odds ratio for admitted to PICU with % 17(OR 1.17; 95% CI 1.082-1.285; p < 0.001), and low oxygen saturation (OR 0.769; %95CI 0.652 -. 0909%; p = 0.000).

Discussion

In our study, infants aged < 1 year accounted for 100% of all admissions to our PICU with bronchiolitis. Our study showed three major predictors for PICU admission inpatient with bronchiolitis,

Clinical course		I.C.U admission (n = 36)		Ward admission (n = 54)		p-value
	Count		% Count	%		
Duration of illness (mean ± SD)		5.00 ± 3.780		5.16 ± 4.623		0.511[2]
Cough	Yes	34	94.4%	53	98.1%	0.338[1]
	No	2	5.6%	1	1.9%	
Wheeze	Yes	36	100.0%	52	96.3%	0.243[1]
	No	0	0.0%	2	3.7%	
Respiratory rate (mean ± SD)		65.53 ± 6.784		53.54 ± 7.750		< 0.001[2]
Heart rate (mean ± SD)		150.39 ± 22.501		147.52 ± 22.343		< 0.553[2]
O2 saturation (mean ± SD)		86.69 ± 5.985		93.17 ± 3.710		< 0.001[2]
Steroid given	Yes	36	100.0%	49	90.7%	0.060[1]
	No	0	0.0%	5	9.3%	
Inhaled B2 agonist	Yes	35	97.2%	54	100.0%	0.218[1]
	No	1	2.8%	0	0.0%	
Antibiotics	Yes	36	100.0%	52	96.3%	0.243[1]
	No	0	0.0%	2	3.7%	
Chest X ray	Normal	31	86.1%	48	88.9	0.693[1]
	Abnormal	5	13.9%	6	11.1%	

Table 2: Presentation and clinical course among children with bronchiolitis, according to word admission VS ICU admission**.**

The values were expressed as frequency, percentage. [1]: Chi square test.[2] Independent sample T test. P < 0.05 is statistically significant.

Characteristic	Coefficient B	P-value	OR	%95CI
Bottle feeding	1.793	.015	6.006	1.425-25.307
Respiratory rate	.165	.000	1.179	1.082-1.285
O2 saturation	-.262-	.002	.769	0.652-.0909
Constant	11.013	-	-	

Table 3: Logistic regression analysis of the factors associated with I.C.U admission to Jala Children's Hospital in Tripoli, Libya.

OR = Odds Ratio; CI = Confidence Interval.

bottle feeding, rapid respiratory rate, and low oxygen saturation. However, our findings with regard to Formula-fed infants with bronchiolitis are more likely to develop severe bronchiolitis and require PICU hospitalization than breast-fed infants with bronchiolitis than breast feeding infants with bronchiolitis (p value 0.015). This finding is in agreement with oddy wh., *et al*. which showed that Study of 2602 live born children established through antenatal clinics at the major tertiary obstetric hospital in Perth, Western Australia. Hospital visits for four or more upper respiratory tract infections were significantly greater if predominant breast-feeding was stopped before 2 months [10]. Rapid respiratory rate (mean 65.53+-6.84 breaths/min) is also a predictor of PICU admission with (p = 0.000), which is consistent with a previous prospective cohort study of hospitalized children aged 2 years with bronchiolitis from 2007 to 2010, for three consecutive winter seasons. The first inpatient day's respiratory rate of 70 beats per minute predicted a subsequent transfer to the intensive care unit [11]. Low oxygen saturation at room air (Spo2) was found to be a predictive factor for ICU admission in the current study (mean 86.6 percent 5.9%) with a p value of 0.000, whereas in another study [12], the cutoff point for oxygen saturation was less than 90 percent, and this variation could be due to the fact that our hospital is a tertiary hospital that receives more critical cases from other hospitals.

Conclusion and Recommendation

Bottle-feeding, lower oxygen saturation and rapid respiratory rate were identified to be three independent predictor factors for admission of patients with bronchiolitis to PICU in our study. We suggest that our hospital's emergency department develop criteria and protocols for ICU admission.

Acknowledgements

We offer our first and last thanks to Allah who has given us the ability to accomplish this work. We thank people who have played a major role in the success of this work by their feedback and guidance during the preparation of this work. Great thanks to Dr. Abdulbasit Afhayl Alboum For his great help for their assistance with analyses and data presentation.

Bibliography

1. Naz R., *et al*. "Etiology of acute viral respiratory infections common in Pakistan: A review". *Reviews in Medical Virology* 29.2 (2019): 1-6.

2. Øymar K., *et al*. "Acute bronchiolitis in infants, a review". *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine* 22.1 (2014): 1-10.

3. Shantanam S. "乳鼠心肌提取 HHS Public Access". *Physiology Behavior* 176.1 (2018): 139-148.

4. Fretzayas A and Moustaki M. "Etiology and clinical features of viral bronchiolitis in infancy". *World Journal of Pediatrics* 13.4 (2017): 293-299.

5. El Basha NR., *et al*. "Prematurity, a significant predictor for worse outcome in viral bronchiolitis: A comparative study in infancy". *Journal of Egyptian Public Health Association* 94.1 (2019): 1-6.

6. Janahi I., *et al*. "Viral aetiology of bronchiolitis in hospitalised children in Qatar". *BMC Infectious Disease* 17.1 (2017): 139.

7. Picone S., *et al*. "Comparing of two different epidemic seasons of bronchiolitis". *Italian Journal of Pediatrics* 44.1 (2018): 10-11.

8. Ghazaly M and Nadel S. "Characteristics of children admitted to intensive care with acute bronchiolitis". *European Journal of Pediatrics* 177.6 (2018): 913-920.

9. Kenmoe S., *et al*. "Systematic review and meta-analysis of the prevalence of common respiratory viruses in children < 2 years with bronchiolitis in the pre COVID-19 pandemic era". *PLOS One* 11 (2020): 1-16.

10. Oddy WH., *et al*. "Breast feeding and respiratory morbidity in infancy: A birth cohort study". A*rchives of Disease in Childhood* 88.3 (2003): 224-228.

11. Macias G., *et al*. *HHS Public Access* 15.1 (2016): 77-81.

12. Walsh P., *et al*. "A validated clinical model to predict the need for admission and length of stay in children with acute bronchiolitis". *European Journal of Emergency Medicine* 11 (2004): 265-272.