

A Clinical Audit for Children with Acute Bronchiolitis at Assiut University Children's Hospital

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Abstract

Background: Bronchiolitis is a disorder most commonly caused in infants by viral infection. It is the most common lower respiratory tract infection in the first two years of life. Signs and symptoms are typically rhinitis, tachypnea, wheezing, cough, crackles, use of accessory muscles, and/or nasal flaring.

Aim of Study: Comparing lines of management of acute bronchiolitis in children in our hospital with Nottingham University Children's Hospital guideline for the management of acute bronchiolitis in children.

Patients and Methods: Data of 160 children from 1 month to 2 years of age with acute bronchiolitis admitted at Assiut University Children's Hospital during the period between 1 of April 2015 to 31 of March 2016 was collected and analyzed and clinical management was compared with the standard management guidelines according to Nottingham University Children's Hospital guideline for the management of acute bronchiolitis in children (July 2013).

Results: The study included 119 males (74.3 %) and 41 females (25.63%). CBC was done to 154 cases (96.3%), chest X-ray was done to 149 cases (93.1%), pulse oximetry was done to 130 cases (81.3%). All patients (160 cases, 100%) received antibiotics, nebulised hypertonic saline and Inhaled Salbutamol, while 136 cases (85%) received intravenous fluids, 117 cases (73.1 %) received oxygen therapy, 100 cases (62.5%) received inhaled Ipratropium.

Conclusion: We need to stick with the international guidelines as a reference standard to avoid missing important investigations or use of unnecessary investigations or lines of management unless recommended to improve the health services provided in Emergency Unit.

Key Words: Bronchiolitis – Respiratory infections – Respiratory Syncytial Virus (RSV) – Management guidelines – Bronchodilators – Hypertonic saline inhalation.

Introduction

BRONCHIOLITIS is a disorder most commonly caused in infants by viral infection. It is the most

common lower respiratory tract infection in the first two years of life. It is characterized by acute inflammation, edema and necrosis of epithelial cells lining small airways, increased mucus production, and bronchospasm. Signs and symptoms are typically rhinitis, tachypnea, wheezing, cough, crackles, use of accessory muscles, and/or nasal flaring [1].

Many viruses cause the same constellation of symptoms and signs. The most common etiology is the Respiratory Syncytial Virus (RSV), with the highest incidence of RSV infection occurring between December and March ninety percent of cases are infected with RSV in the first 2 years of life [2]. Other viruses identified as causing bronchiolitis are human metapneumovirus, influenza, adenovirus, and parainfluenza [2].

Patients and Methods

Data of 160 children from 1 month to 2 years of age admitted with acute bronchiolitis at Assiut University Children's Hospital during the period between 1 of April 2015 to 31 of March 2016 is collected and analyzed and clinical management is compared with the standard management of Nottingham university children's hospital guideline for the management of acute bronchiolitis in children (July 2013).

Admission criteria:

Every patient was individually assessed for admission status as there is no well validated bronchiolitis scoring system to guide admission decisions.

The following features prompted consideration of admission: Oxygen saturations <94% in room air, respiratory rate >70 per minute, marked recession/respiratory distress/grunting respirations,

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history of apneas, taking <50% usual feeds / concerning hydration status, lethargic or appears unwell. These criteria were for guidance only. Duration of illness was also a relevant factor. Peak of illness with bronchiolitis was typically 4-5 days, therefore infants with moderate symptoms presenting before this time was considered for admission.

Results

Our study was done on children with bronchiolitis admitted at Assiut University Children's Hospital over one year in the period from the 1st of April, 2015 to the 31st of March, 2016.

A- Demographic data:

Our study included 160 cases, 119 males (74.37%) and 41 females (25.63%) which was found to be statistically significant ($p<0.001$).

The median age of cases was (3) months, while (mean age \pm SD) was (4.1 \pm 3.75) months. About 125 cases (78.1% of all cases) were at the age group less than 6 months (Group A), while 25 cases (15.6%) were at the age group from 6 up to less than 12 months (Group B), 7 cases (4.4%) were at the age group from 12 up to less than 18 months (Group C), 3 cases (1.9%) were at the age group from 18 to 24 months (Group D). Was found that the younger age Group (A) <6 months had significantly severe disease than other age groups ($p<0.001$), Group (B) versus Groups (C,D) found to have significantly severe disease than the older ones that necessitate hospital admission ($p<0.001$), while Group (C) versus Group (D) was not significantly different.

Patients from rural areas were 105 cases (65.6%), while those from urban areas were 55 cases (36.4%), which was found to be statistically significant ($p<0.001$).

Sixty five cases (40.6%) of our patients were on breast feeding, while 89 cases (55.6%) were on artificial feeding, the difference was statistically significant ($p<0.007$) as shown in Table (1).

B- History and presenting symptoms of bronchiolitis in studied patients:

We found that the main symptoms were difficulty in breathing in 156 cases (97.5%), coryzal symptoms (rhinorrhea, sneezing) in 136 cases (85%), poor feeding in 133 cases (83.1%), fever in 103 cases (64.4%), dry cough in 105 cases (65.6%), wheezy cough in 83 cases (51.8%), cyanosis in 11 cases (6.9%) and apnea in 2 cases (1.2%), while 15 cases (9.4%) had a history of

premature labour and 5 cases (3.1%) had history of congenital heart disease as shown in Table (2).

Table (1): Demographic data.

Variable	No.	%	<i>p</i> -value
Total number of cases	160	100	
<i>Age:</i>			
Median (month)	3		
Mean \pm SD (month)	4.1 \pm 3.75		
(a) 0-<6 (month)	125	78.1	<0.001**
(b) 6-<12 (month)	25	15.6	
(c) 12-<18 (month)	7	4.4	
(d) 18-24 (month)	3	1.9	
<i>Sex:</i>			
Male	119	74.37	<0.001**
Female	41	25.63	
<i>Residence:</i>			
Rural	105	65.6	<0.001**
Urban	55	34.4	
<i>Type of feeding:</i>			
Breast feeding	65	40.6	<0.007**
Artificial feeding	89	55.6	

a Vs. b,c,d <0.001.

b Vs. c,d <0.001.

c Vs. d N.S ($p=0.2$).

** : Statistically significant difference ($p<0.01$).

Table (2): History and presenting symptoms of bronchiolitis in studied patients.

History and presenting symptoms	Total number of patients (160)			
	Yes		No	
	No.	%	No.	%
Difficulty in breathing	156	97.5	4	2.5
Coryzal symptoms (rhinorrhea, sneezing)	136	85	24	15
Poor feeding (dyspnea associated)	133	83.1	27	16.9
Dry cough	105	65.6	55	34.4
Fever	103	64.4	57	35.6
Wheezy cough	83	51.9	77	48.1
Ex-preterm infant	15	9.4	145	90.6
Cyanosis	11	6.9	149	93.1
Congenital heart disease	5	3.1	155	96.9
Apnea	2	1.2	158	98.8
Chronic lung disease	0	0	160	100

C- Clinical finding of bronchiolitis in studied children:

According to general examination about 41 cases (25.6%) had unwell general condition due to severe respiratory distress or severe dehydration, while 40 cases (25%) were suffering from pallor, 8 cases (5%) were suffering from cyanosis.

According to systemic examination about 5 cases (3.1%) had congenital heart disease, 160 cases (100%) had tachypnea, 11 cases (6.9%) had mild respiratory distress (grade I), about 120 cases (75%) had moderate respiratory distress (grade II) and 25 cases (15.6%) had severe respiratory distress

(grade III and IV). About 56 cases (35%) had wheeze only, while 104 cases (65%) had wheeze and wide spread inspiratory crackles. About 5 cases (3.1%) had abnormal neurological finding in the form of irritability or drowsiness as shown in Table (3).

Table (3): Clinical finding of bronchiolitis in studied cases.

Examination	Total number of patients (160)			
	Yes		No	
	No.	%	No.	%
• General condition (unwell, toxic).	41	25.6	119	74.4
• Pallor.	40	25	120	75
• Cyanosis.	8	5	152	95
• Clubbing.	0	0	160	100
• Vital signs: (Temperature, respiratory rate, heart rate, blood pressure).	160	100	0	0
• Cardiac examination: (Congenital heart disease).	5	3.1	155	96.9
• Chest examination:				
Tachypnea	160	100	0	0
• Respiratory distress:				
Grade I	11	6.9	149	93.1
Grade II	120	75	40	25
Grade III	16	10	144	90
Grade IV	9	5.6	151	94.6
Wheeze	160	100	0	0
Widespread fine inspiratory crackles	104	65	56	35
• Abnormal finding in abdominal examination.	0	0	160	100
• Abnormal finding in neurological examination.	5	3.1	155	96.9

D- Laboratory and radiological findings among studied case:

As shown in Fig. (1), CBC was done to 154 cases (96.3%) 122 cases of 154 cases (79.2%) had normal parameters and no intervention was needed, while 3 cases (1.9%) had severe pallor and received blood transfusion. Another 29 cases (18.8%) suffered from pallor and mild to moderate anemia and received iron therapy.

Chest X-ray was done to 149 cases (93.1%), while pulse oximetry was done to 130 cases (81.3%), ABG was done to 31 cases (19.4%), kidney function and electrolytes was done to 91 cases (56.9%) which all had normal kidney function and electrolytes parameters but only 2 cases of 91 cases (2.2%) had mild hyponatremia and 3 cases of 91 cases (3.3%) had mild hyperkalemia.

E- Management:

According to management, all patients (160 cases, 100%) received antibiotics, nebulised hypertonic saline and Inhaled Salbutamol, while 136

cases (85%) received intravenous fluids, 117 cases (73.1%) received oxygen therapy, 100 cases (62.5%) received inhaled Ipratropium, 74 cases (46.3%) received oral or intravenous corticosteroids, 36 cases (22.5%) had chest physiotherapy and 33 cases (20.6%) received intravenous or oral bronchodilators as shown in Fig. (2).

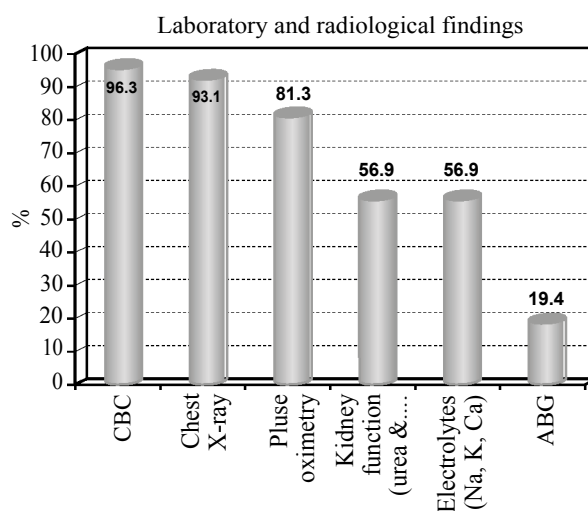


Fig. (1): Laboratory and radiological findings.

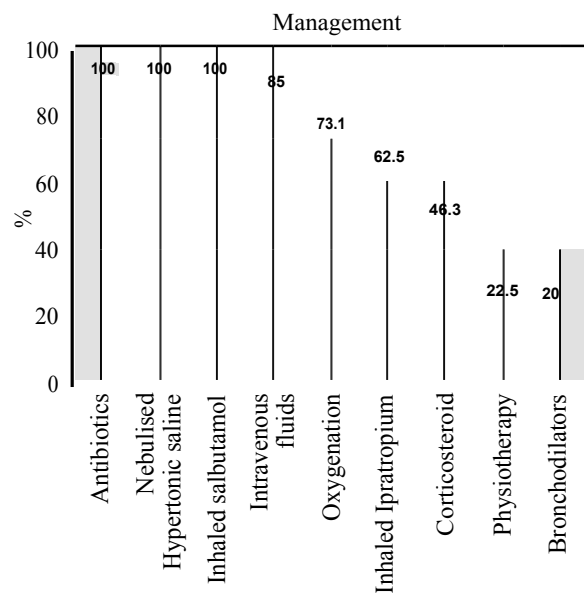


Fig. (2): Management results. Protocols followed.

F- Outcome of studied cases:

As shown in Table (4), 157 cases (98.1%) improved with complete resolution, while 3 cases (1.9%) died as they were at high risk age (2 males at age of 40 days one of them had preterm labour and 1 female at age of 45 days) were suffering from severe respiratory distress. The duration of admission ranged from 3 days up to 8 days.

Table (4): Outcome of studied cases.

Prognosis	Total number of patients (160)	
	No.	%
Resolution	157	98.1
Died	3	1.9
Duration of admission in days	3-8	

Discussion

In this audit, we needed to highlight some strengths and deficiencies in the medical care of children admitted with bronchiolitis in our hospital and to assess the of lines of management and compare them with Nottingham University Children's Hospital guideline for the management of acute bronchiolitis in children.

Our study was done on children with bronchiolitis admitted at Assiut University Children's Hospital over one year in the period from the 1st of April, 2015 to the 31st of March, 2016.

Our study included 160 cases, 119 males (74.37%) and 41 females (25.63%) which was found to be significant ($p < 0.001$). Our results are in agree with Mage et al., [10], who found that bronchiolitis occurs as much as 1.25 times more frequently in males than in females. The exact reason for this difference is unknown.

The median age of cases was (3) months, while (mean age \pm SD) was (4.1 \pm 3.75) months. About 125 cases (87.1% of all cases) were at the age period less than 6 months (Group A). According to Deshpande et al., 2003, Bronchiolitis mainly affects infants under two years of age. Ninety percent of cases requiring hospitalization occur in infants under twelve months of age. Incidence peaks at age three to six months.

In a prospective study of 90 infants hospitalized with acute bronchiolitis (mean age 4.4 months) [3].

Patients from rural areas were 105 cases (65.6%), while those from urban areas were 55 cases (36.4%), which found to be significant ($p < 0.001$). In contrast to our results a study of >6 million infants born in California between 1993 and 2005, infants from small rural counties had decreased inpatient utilization, including lower hospitalization rates and fewer hospitalized days, than infants from large urban counties during their first year of life [4].

About 65 cases (40.6%) were on breast feeding, while 89 cases (55.6%) were on artificial feeding, which was found to be significant ($p < 0.007$). A case control study found that breast feeding was associated with a lower risk of RSV hospitalization in infants under and over six months of age. Breast feeding reduces the risk of RSV-related hospitalization and should be encouraged and supported [5].

Pulse oxymetry was done for (81.3%) of patient at time of admission which is an important item in the evaluation of the clinical status of the patient, according to Nottingham University Children's Hospital guideline for the management of acute bronchiolitis in children it should be done to all [patients. so](#) we should encourage using pulse oxymetry for all patients.

The admission criteria were fulfilled in the majority of patients (95%) but in a small group (5%) there was no clear indication for admission and they should had outpatient treatment. This is an important point to reduce possibility of nosocomial infection and economic load.

We found that the main symptoms were difficulty in breathing in 156 cases (97.5%), coryzal symptoms (rhinorrhea, sneezing) in 136 cases (85%), poor feeding in 133 cases (83.1%).

According to general examination about 41 cases (25.6%) had unwell general condition due to severe respiratory distress, severe pallor or severe dehydration, while 40 cases (25%) were suffering from pallor, 8 cases (5%) were suffering from cyanosis.

According to systemic examination 160 cases (100%) had tachypnea, 11 cases (6.9%) had mild respiratory distress (grade I), about 120 cases (75%) had moderate respiratory distress (grade II) and 25 cases (15.6%) had severe respiratory distress (grade III and IV). About 5 cases (3.1%) had congenital heart disease.

According to Nottingham University Children's Hospital guideline for the management of acute bronchiolitis in children (2013) as a reference standard, there is no well validated bronchiolitis scoring system to guide admission decisions. Bronchiolitis is a clinical diagnosis-as is the requirement for admission. The following features should prompt consideration of admission, Oxygen saturations $< 94\%$ in room air, respiratory rate > 70 per minute, marked recession/respiratory distress/ grunting respirations, history of apneas, taking

<50% usual feeds/concerning hydration status, lethargic or appears unwell. These criteria are for guidance only but if in doubt, subject should be discussed with senior.

Also considering social circumstances and duration of illness is also a relevant factor. Peak of illness with bronchiolitis is typically 4-5 days, therefore infants with moderate symptoms presenting before this time should be considered for admission.

In our study there were 15 cases (9.4%) who had a history of premature labour, 5 cases (3.1 %) had congenital heart disease while, cyanosis was present in 8 cases (5%) and apnea in 2 cases (1.2%).

According to Nottingham University Children's Hospital guideline (2013), the following have increased risk of severe illness and should have lower admission threshold, infants <6 week age, ex-preterm infants, chronic lung disease, congenital heart disease, immunodeficiency, trisomy 21 or other syndromic association.

According to Nottingham University Children's Hospital guideline (2013), admission to PICU is indicated in cases:

- 1- Failure to maintain oxygen saturations >92% despite increasing oxygen.
- 2- Deteriorating respiratory status (increasing signs of respiratory distress and/or exhaustion).
- 3- Recurrent apneas.

There is usually overuse of laboratory and radiological investigation, which may be misleading in certain occasions and lead to maluse of medications.

Chest X-ray was done to 149 of our cases (93.1 %). In a systematic review of the use of chest X-ray in acute bronchiolitis it was concluded that, in mild disease, chest X-ray provides no information that is likely to affect treatment [6]. Chest radiography is not routinely required but should be considered after a sudden clinical deterioration according to Nottingham University Children's Hospital guideline.

In our study pulse oximetry was done to 130 cases (81.3%). According to Nottingham University Children's Hospital guideline pulse oximetry should be recorded on all patients.

CBC was done to 154 cases (96.3%) 122 cases of 154 cases (79.2%) had normal parameters and

no intervention was needed, while 3 cases (1.9%) had severe pallor and received blood transfusion. Another 29 cases (18.8%) suffered from pallor and mild to moderate anemia and received iron therapy. Full blood count is not indicated in assessment and management of infants with typical acute bronchiolitis [7]. Blood tests are not routinely required according to Nottingham University Children's Hospital guideline.

ABG was done to 31 cases (19.4%) all with severe respiratory distress either grade III or IV. According to Nottingham University Children's Hospital guideline blood gases may be useful if advanced respiratory support is being considered. Blood gas analysis (capillary or arterial) is not usually indicated in acute bronchiolitis. It may have a role in the assessment of infants with severe respiratory distress or who are tiring and may be entering into respiratory failure. Knowledge of arterialized carbon dioxide values may guide referral to high dependency or intensive care [8].

Kidney function and electrolytes was done to 91 cases (56.9%) which all had normal kidney function and electrolytes parameters but only 2 cases of 91 cases (2.2%) had mild hyponatremia and 3 cases of 91 cases (3.3%) had mild hyperkalemia. Measurement of urea and electrolytes is not indicated in the routine assessment and management of infants with typical acute bronchiolitis but should be considered in those with severe disease [9]. According to Nottingham University Children's Hospital guideline urea (U) and electrolytes (E) may be performed when IV fluids are required.

So reduction of investigations is a must to decrease the hazards on the patients and the economic load on the hospital.

According to Nottingham University Children's Hospital guideline (2013), oxygenation, nutrition and fluid balance are key priorities in management.

Oxygen therapy: In our study 117 cases (73.1%) received oxygen therapy all of them the oxygen saturation was below 90%. According to Nottingham University Children's Hospital guideline supplemental oxygen should be initiated for oxygen saturations 90% or below. The aim is to keep oxygen saturation >92%.

Intravenous fluids: 136 cases (85%) received intravenous fluids due to poor feeding and/or severe respiratory distress. Nottingham University Children's Hospital guideline recommended small,

frequent sucking feeds to be used for mild cases. Nasogastric feeds may be required if the child is taking less than 50% requirements or respiratory rate >60/min on supplemental oxygen. Intravenous fluids should be reserved for severe illness with severe respiratory distress or when nasogastric feeds are not tolerated. Restrict to 70% of maintenance due to possible Syndrome of inappropriate antidiuretic hormone secretion (SIADH) with RSV infection.

Antibiotics: All patients in our study (160 cases, 100%) received antibiotics. The overuse of antibacterial therapy may be due to the presence of high grade fever in some patients or secondary bacterial infection, also radiological findings may be a participating factor. According to Nottingham University Children's Hospital guideline use of antibiotics is not recommended unless there is bacterial co-infection.

Nebulised hypertonic saline: All patients (160 cases, 100%) received nebulised hypertonic saline. According to Nottingham University Children's Hospital guideline it is recommended to use nebulised hypertonic saline.

Inhaled Salbutamol or ipratropium: All patients (160 cases, 100%) received inhaled salbutamol and 100 cases (62.5%) received ipratropium but both were used alternatively with hypertonic saline. According to Nottingham University Children's Hospital guideline it is recommended to co-administer nebulised hypertonic saline with inhaled bronchodilators to prevent bronchospasm due to use of hypertonic saline.

Bronchodilators (oral or IV): 33 cases (20.6%) received intravenous or oral bronchodilators. According to Nottingham University Children's Hospital guideline it is not recommended to use oral or IV bronchodilators.

Corticosteroids: Seventy four cases (46.3%) received oral or intravenous corticosteroids. According to Nottingham University Children's Hospital guideline it is not recommended to use oral or IV corticosteroids.

Chest physiotherapy: 36 cases (22.5%) had chest physiotherapy. According to Nottingham University Children's Hospital guideline there is no evidence to support the routine use of chest physiotherapy in bronchiolitis. Physiotherapy is likely to be beneficial for bronchiolitis patients requiring admission to PICU.

Outcome of studied cases:

One hundred fifty seven cases (98.1 %) improved with complete resolution, while 3 cases (1.9%) died as they were at high risk age (2 males at age of 40 days one of them had preterm labour and 1 female at age of 45 days) they were suffering from severe respiratory distress. Death is 1.5 times more likely in males [10].

In our study the duration of admission ranged from 3 days up to 8 days, according to Nottingham University Children's Hospital guideline peak of illness with bronchiolitis is typically 4-5 days, therefore infants with moderate symptoms presenting before this time should be considered for admission.

High risk infants:

The following have increased risk of severe illness and should have lower admission threshold: Infants <6 week age, ex-preterm infants, chronic lung disease, congenital heart disease, immunodeficiency, trisomy 21 or other syndromic association.

Conclusion:

We need to stick with the international guidelines as a reference standard to avoid missing important investigations or use of unnecessary investigations or lines of management unless recommended to improve the health services provided in emergency unit.

References

- 1- Agency for Healthcare Research and Quality. Management of Bronchiolitis in Infants and Children. Evidence Report/Technology Assessment No. 69. Rockville, MD: Agency for Healthcare Research and Quality. AHRQ Publication No. 03-E014, 2003.
- 2- GREENOUGH A., COX S., ALEXANDER J., et al.: Health care utilization of infants with chronic lung disease, related to hospitalization for RSV infection. Arch. Dis. Child., 85: 463-8, 2001.
- 3- LEADER S. and KOHLHASE K.: Recent trends in severe Respiratory Syncytial Virus (RSV) among US infants, 1997 to 2000. J. Pediatr., 143 (5 suppl): S 127-S 132, 2003.
- 4- FITZGERALD D.A. and KILHAM H.A.: Bronchiolitis: Assessment and evidencebased management. Med. J. Aust., 180 (8): 399-404, 2008.
- 5- RAY K.N. and LORCH S.A.: Hospitalization of Rural and Urban Infants During the First Year of Life. www.pediatrics.org/cgi/doi/10.1542/peds.2012-002. 2012.
- 6- BULKOW L.R., SINGLETON R.J., KARRON R.A., HARRISON L.H. and ALASKA R.S.V.: Study Group. Risk factors for severe respiratory syncytial virus infection among Alaska Native children. Pediatrics, 109 (2 Pt 1): 210-6, 2006.

- 7- VISWANATHAN M., KING V.J., BORDLEY C., HONEYCUTT A.A., WITTENBORN J., JACKMAN A.M., et al.: Management of bronchiolitis in infants and children. Rockville (MD): U.S. Department of Health and Human Services, Agency for Healthcare Research and Quality; 2003. Evidence Report/ Technology Assessment Number 69. [cited 22 August 2006].
- 8- MULHOLLAND E.K., OLINSKY A. and SHANN F.A.: Clinical findings and severity of acute bronchiolitis. Lancet, 335 (8700): 1259-61, 2007.
- 9- RAKSHI K. and COURIEL J.M.: Management of acute bronchiolitis. Arch. Dis. Child., 71 (5): 463-9, 2004.
- 10- MAGE D.T. and DONNER E.M.: The fifty percent male excess of infant respiratory mortality. Acta. Paediatr. Sep., 93 (9): 1210-5, 2004.

دراسة تدقيقية للأطفال المصابين بالتهاب الشعبات الهوائية الحاد الذين يتم دخولهم مستشفى الأطفال الجامعي بأسيوط

إلتهاب الشعبات الهوائية مرض فيروسي أكثر شيوعاً في الأطفال وهي عدوى الجهاز التنفسي الأكثر شيوعاً خلال أول عامين وتتمثل أعراض المرض في الرشح وأزيز الصدر وسرعة التنفس والسعال وخشخشة الصدر واستخدام العضلات المساعدة للصدر مع تحرك جناحي الأنف لزيادة دخول الهواء.

المرضى ومنهج الدراسة: تم تجميع وتحليل بيانات ١٦٠ طفل تتراوح أعمارهم من شهر إلى عامين مصابين بالتهاب الشعبات الهوائية الحاد والذين تم إستقبالهم بمستشفى أسيوط الجامعي للأطفال خلال الفترة من ١ أبريل ٢٠١٥ إلى ٣١ مارس ٢٠١٦ وتم مقارنة علاجنا الطبي بالتوجيهات العلاجية الإرشادية القياسية لمستشفى أطفال نوتنجهام الجامعي لعلاج إلتهاب الشعبات الهوائية الحاد في الأطفال (يوليو ٢٠١٣).

النتائج: ضمت الدراسة ١١٩ نكر (٧٤.٣٧٪) و٤١ أنثى (٢٥.٦٣٪) تم إجراء تحليل صورة دم كاملة إلى ١٥٤ حالة (٩٦.٣٪) وتم إجراء أشعة سينية للصدر إلى ١٤٩ حالة (٩٣.١٪) وتم قياس نسبة التأكسج إلى ١٣٠ حالة (٨١.٣٪) تم إعطاء جميع الحالات مضادات حيوية وإستنشاق محلول ملحي مركز وسالبيوتامول بينما تم إعطاء ١٣٦ حالة (٨٥٪) محاليل وريدية و١١٧ حالة (٧٣.١٪) تم منحها أكسجين وتم إعطاء ١٠٠ حالة (٦٢.٥٪) ابراتروبيم مستنشق.

الإستنتاج: يجب علينا الإلتزام بالتوجيهات الإسترشادية العالمية كمرجع قياسي حتى لا نفوت إجراء فحوصات ضرورية أو نجرى فحوصات أو طرق علاجية غير ضرورية ما لم تكن موصى بها لتحسين الخدمات الصحية المقدمة في وحدة إستقبال الطوارئ.