# **Original Research Article**

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# Applicability of respiratory severity score and modified TAL criteria in pediatric age group for grading and management of acute respiratory illness

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### **ABSTRACT**

**Background:** Acute respiratory tract infections (ARI) are the leading cause of death in children in the world (11.9 million per year) with the greatest number of deaths occurring in developing countries like India. We compared respiratory severity scoring system RSS (Respiratory Severity Score) with Modified TAL, so that we can find out which of the above scores are better and whether they can be implemented to assess pediatric ARI patients.

**Methods:** This prospective observational study was conducted in Pediatrics wards, Shri Vasantrao Naik Government Medical College, Yavatmal, Maharashtra and data were collected from 290 children below 12 years of age by purposive sampling. All the children presenting with respiratory symptoms were subjected to these scoring system (RSS AND MODIFIED TAL) at the time of admission and were classified based on the scores obtained in respective scoring system. Data was analysed using frequencies, percentages and contingency tables and comparison was made between the above scoring systems to find which one is better applicable in pediatric ARI patient.

**Results:** Incidence of pediatric patients presenting with only respiratory tract infections who are admitted in ward was 25.15 %, with more incidence being reported in children below 12 months (49.31%), males more affected. For both the ARI scoring systems (RSS and MOD TAL) as the severity increased so is the number of patients requiring oxygen and duration of hospitalization increased significantly (p<0.05), with RSS having stronger association.

**Conclusions:** Both the scoring systems predicted that on admission if the score is more than chances of requirement of oxygen is more and also duration of hospitalization is more, with RSS being better predictor.

Keywords: Applicability, Acute respiratory tract infections, Children, Outcome, Respiratory severity score, TAL

# INTRODUCTION

Acute respiratory tract infections (ARI) is the leading cause of death in children in the world (11.9 million per year) with the greatest number of deaths occurring in developing countries.<sup>1</sup> Although implementation of safe ,effective and affordable intervention has reduced mortality from ARI but still it account for one fifth deaths in developing countries.<sup>2,3</sup> Of the total deaths due to ARI in India ,approximately one fourth (2.5 million) are in

children less than five years of age.<sup>4</sup> Considering the prevalence of ARI the use of an objective measure of severity of respiratory illness would have implications in clinical management as well as clinical research. There have been many severity scores that have been developed for various purposes, such as development of WHO grading of respiratory illness RISC(respiratory index of severity in children) score among young children with respiratory infections in South Africa.<sup>5,6,7</sup> Moreover, it is crucial to treat acute respiratory infections appropriately

to avoid risk of respiratory failure, which is fatal in children. Severe cases must be triaged and treated immediately, therefore it is important to assess respiratory condition at first contact. Hence these scores may help to assess and classify respiratory illness.

Most recently Million death study collaborators has found estimate of LRI associated mortality in India, in which pneumonia was held responsible for 369,000 deaths (28 % of all deaths) below 5 years, making it the single most important cause of death in this age group. Acute respiratory tract infections (ARI) are being increasingly recognized as a major cause of childhood mortality, being a third of all under five deaths in developing countries.

The single largest contributor of childhood morbidity and mortality is acute respiratory tract infection with estimated 3-5 episodes every year, with nearly 24 million cases of ARI, and 2612 deaths. 9,10,11 Amongst all the children attending the pediatric OPD 30-50% of patients and almost 20-40% of hospital admissions may be due to ARI and pneumonia. 12

The majority of scores are applied to hospitalized children where many healthcare resources and broader testing may be available and also there are large number of children with respiratory tract infection in resource limited country like India, whether to subject children for the treatment or other investigation is a problem. To address this issue.

Authors want to compare respiratory severity scoring system like Modified TAL with RSS (Respiratory Severity Score) so that we can find out which of the above two scores are better and whether they can be implemented to assess pediatric ARI patients.<sup>13,14</sup>

# Aim and objectives

- To find out the incidence of acute respiratory infection in hospitalized children less than 12 years of age
- To classify the respiratory tract infection based on scoring system namely RSS and modified TAL and to study its applicability in pediatric ARI patients
- To find out which score is better predictor of severity in ARI based on oxygen requirement and duration of hospital stay.

# **METHODS**

# Source of data

Children between the age of one day to twelve years of age admitted in Pediatric ward with respiratory symptoms were included in the study after written informed consent in this hospital during the term between 1st May 2017 to 31st January 2018.

## Method of collection of data

Sample size is all the patients admitted in pediatric ward with respiratory system illness during the term 1<sup>st</sup> May 2017 to 31<sup>st</sup> January 2018, after considering inclusion and exclusion were taken up in this study. Sampling method is Purposive sampling. Type of study is Hospital based observational prospective study

### Inclusion criteria

Children between the age group one day to twelve years of age presenting with respiratory symptoms were included in study

### Exclusion criteria

- Children who were hemodynamically unstable.
- Children who were suffering from chronic respiratory tract illness (e. g. Asthma, Emphysema, Chronic bronchitis etc.)
- Children having concurrent other organ system disease

Method of this study is all children admitted to pediatric wards (ward 9,10,11) of our hospital presenting with respiratory symptoms during the period of 1<sup>st</sup> May 2017 to 31<sup>st</sup> January 2018 after taking written informed consent were included. A detailed history and physical examination were done at the time of admission. All the included pediatric patients were subjected to these scoring system (RSS AND MODIFIED TAL) at the time of admission.

Total score was arrived at by addition of score for individual clinical signs and were classified based on this total score obtained in respective scoring system into the severity groups (Table 1 and 2), then these findings were entered on specially designed proforma.

Details of individual scores for clinical signs and classification in different groups based on total score given in Table 1 for RSS and Table 2 for Modified TAL.

Scoring systems used in this study and their method of application

RSS (Respiratory Severity Score)

Modified TAL clinical score

These included children were followed up in the ward for following parameters

- Need for oxygen therapy
- Duration of hospital stays

The data thus obtained was compared in between these scoring systems and efforts are made to find out which of the two scoring systems is better applicable in pediatric ARI patient.

### Statistical methods

Descriptive statistics, frequencies and percentages, contingency tables using Microsoft excel 10.

# For interpretation of data

- Chi-square test with significance level kept at 0.05 was used for oxygen requirement
- ANOVA test with significance level kept at 0.05 was used for duration of hospitalization

Both the test was applied in each scoring system to see for significant difference with respect to outcome.

For comparison of the two scoring systems (Modified TAL and RSS) to see which one is better predictor

- With respect to oxygen requirement as outcome Binary Logistic Regression test was used
- With respect to duration of hospitalization as outcome Multiple Linear Regression test was used

# Investigations

Determination of SPO2 was done by portable pulse oximeter (NELLCORE TRAZE DUO MAX), which works on the principle of differential absorption of infrared and red light by oxygenated and deoxygenated hemoglobin.

Site of application in Pediatric patients was fingers while in infants' site was foot.

# Follow up: yes

The patients who were enrolled in this study were followed up during their entire period of hospitalization for oxygen requirement and duration of hospitalization.

Table 1: Four parameters measured in RSS which are as follows.

Score	Respiratory rate	Wheeze	Spo2 at room air	Accessory respiratory muscle utilization			
0	<30	None	>95	None			
1	31-45	End expiratory only audible by stethoscope	90-94	Mild intercostal indrawing			
1.5		Not otherwise specified		Not otherwise specified			
2	46-60	Entire expiration and inspiration with stethoscope only	85-89	Moderate amount of intercostal indrawing			
3	>60	Audible without stethoscope	<85	Severe intercostal indrawing with presence of head bobbing			
	Based on total score lower value for LRTI in their study was 4 so score equal to or above this is taken as severe and less than or equal to 3 is taken as mild.						
≤ 3	Mild						
≥ 4	Severe						

Table 2: Four parameters measured in mod TAL are.

Score	Respiratory rate	Wheeze	Cyanosis	Accessory muscle use			
0	<30	None	None	None			
1	31-45	End expiration with stethoscope	Perioral with crying	+			
2	46-60	Inspiration and Expiration with stethoscope	Perioral at rest	++			
3	>60	Audible without Stethoscope	Generalized at rest	+++			
0-12	Sum of four compo	nents					
	Based on total sco	re ARI is classified as					
<6	Mild						
7-9	Moderate						
10-12	Severe						

# **RESULTS**

In this study a total of 290 children of the age group 1 day to 12 years of age were selected, who presented with

respiratory symptoms and were admitted in pediatric ward of Shri Vasantrao Naik Government Medical College during the period 1st May 2017 to 31st January 2018. During this period a total of 1153 patients were admitted in pediatric ward.

Taking this into account the incidence of pediatric patients presenting with only respiratory tract infections who are admitted in ward comes out to be 25.15%.

Patient characteristics

Total Sample Size (N)=290.

Majority of patients of ARI in the present study were less than 3 years of age 82.75%, with 49.31% of them being infant while preschool and grade school were 8.27% and 8.96% respectively.

Table 3: Age and gender wise distribution of patients.

N=290	Infant < 12 months	Toddler >12 to <36 months	Preschool >36 to <72 months	Grade school >72 to <144 months
Male	83	60	15	19
Female	60	37	09	07
Total	143 (49.31 %)	97 (33.44 %)	24 (8.27 %)	26 (8.96%)
Ratio (M:F)	1.38:1	1.62:1	1.66:1	2.7:1

Male preponderance was present with overall male to female ratio being 1.56:1 (Table 3).

Most common clinical feature among hospitalized children with ARI was increased respiratory rate (68.28%) followed by wheeze (66.89%), accessory muscle use (55.86%), SPO2<95% at room air being present in 14.82% cases while least common was cyanosis (3.79%) (Table 4).

Table 4: Clinical feature according to scoring system.

	Total number of patients-290
Characteristic	Number of Patients
Increased respiratory rate	198 (68.28%)
Wheezing	194 (66.89%)
Accessory muscle use	162 (55.86 %)
SPO <sub>2</sub> <95% at room air	43 (14.82%)
Cyanosis	11 (3.79 %)

# Modified TAL

Maximum number of patients were seen in mild group of Modified TAL criteria in each age classes. There were only 6 patients in severe group of Modified TAL score present study. As the researcher (person who developed Modified TAL criteria) had taken respiratory rate irrespective of age, so the respiratory rate in relation to age will not change the grade of severity that is why data for tachypnea according to WHO not entered in this study. Percentage of patients having wheeze increased significantly from mild to moderate and severe cases (60 to 100%).

Accessory Muscle Use was more in severe and moderate cases (100%) followed by mild cases (47.54%).

Cyanosis- None of the patient in mild cases had cyanosis, 12.5% (5/40) patient in moderate cases had cyanosis, all had perioral cyanosis on crying while in severe cases 100% (6/6) all had cyanosis, 3 had cyanosis on crying and other 3 had perioral at rest (Table 5).

As the severity increases from mild to severe cases so is the duration of hospitalization and percentage of patients requiring oxygen increases.

On application of Chi-square test to the above table for the oxygen requirement, the p value obtained was highly significant (p value=0) denoting that Modified TAL system grading into mild, moderate and severe is highly correlated with oxygen requirement in children.

There is increase in duration of hospital stay with the increase in severity from mild to severe groups of Mod TAL.

On application of ANOVA the p value obtained was highly statistically significant (p value= 0.00), denoting that mild, moderate and severe classes of Modified TAL are highly positively correlated with duration of hospitalization (Table 6).

# Respiratory severity scoring system (RSS)

After application of RSS system to the patient more number of patients were in severe group 158 out of 290 (54.5%) than the mild group 132 out of 290 (45.5%). Percentage of patients having wheeze increased significantly from mild to severe group (from 37.12% to 91.77%). Accessory muscle use in mild cases was

21.96% (29/132) while in severe cases was 83.17 % (133/158). None of the patients in mild group had SPO2 of <95% at room air while 27.21% (43/158) patients in

severe cases had SPO2 of <95% of which 21 had SPO2 between 90-94%, 15 had SPO2 between 85-89 and 7 had SPO2 < 85% (Table 7).

Table 5: Patient and clinical signs distribution according to modified TAL criteria.

	Mild	Moderate	Severe
Total	244 (84.13 %)	40 (13.79%)	6 (2.06 %)
Infant	120	19	4
Toddler	76	19	2
Preschool	22	2	0
Grade school	26	0	0
M: F	150:94	23:17	4:2
Wheeze	148 (60.65 %)	40 (100 %)	6 (100 %)
Accessory muscle use	116 (47.54 %)	40 (100 %)	6 (100 %)
Cyanosis	0	5 (12.5 %)	6 (100%)

Table 6: Outcome with mod TAL.

	Mild (244)	Moderate (40)	Severe (6)	p value
Oxygen requirement (Number of cases)	22 (9%)	38 (95%)	6(100%)	0.0 (Chi-square test)
Duration of hospital stay	5.2±1.665	9.5±2.184	13.17±1.722	0.0 (ANOVA Test)

Table 7: Patients and clinical signs distribution according to RSS system.

	Mild	Severe
Total	132 (45.51%)	158 (54.48 %)
Infant	51	92
Toddler	45	52
Preschool	15	9
Grade school	21	5
M:F	87/45	90/68
Wheeze	49 (37.12%)	145 (91.77%)
Accessory muscle use	29 (21.96%)	133 (84.17%)
SPO2	0 (0%)	43 (27.21%)

Table 8 denotes that percentage of patients requiring oxygen and duration of hospital stay was higher in severe group. On application of Chi-square test to the above table for the oxygen requirement, the p value obtained was highly significant (p value=0) denoting that RSS system grading ARI into mild and severe is highly correlated with oxygen requirement in children.

There is increase in duration of hospital stay with the increase in severity from mild to severe. On application of ANOVA the p value obtained was highly statistically significant (p value = 0.00), denoting that mild and severe classes of RSS system are highly positively correlated with duration of hospitalization, so as the severity group in RSS will increase so the duration of hospitalization will also increase.

Table 8: Outcome with RSS.

	Mild (132)	Severe (158)	p value
Oxygen requirement (Number of cases)	2 (1.51%)	64 (40.5%)	0.0 (Chi- square test)
Duration of Hospitalisation	4.59±1.462	7.11±2.636	0.0 (Anova test)

# Comparison of scoring systems

On application of Binary Logistic Regression test for finding out which severity scoring system is better predictor of oxygen requirement we got the Exp (B) as 0.011 for Modified TAL, 0.071 for RSS with p value 0 in each suggesting that this value is significant as shown in (Table 9).

By applying MLR test with dependent variable as duration of hospital stay and independent variable as Mod TAL and RSS, result shows that B value for Mod TAL to be 3.592 and for RSS to be 1.335, this shows that Mod TAL is better predictor (Table 10). But due to the suppressor effect of RSS we look at the Pearson correlation between them, which shows that, r value for duration of hospital stay for RSS is 0.766 and for Mod TAL r value is 0.728 (Table 11).

Table 9: Binary logistic regression table outcome for oxygen requirement.

Variables in the equation							
		В	S.E.	Wald	df	Sig.	Exp (B)
Step 1a	TAL	-4.474	0.765	34.25	1	0	0.011
	RSS	-2.648	0.754	12.334	1	0	0.071
	Constant	11.297	1.598	49.952	1	0	80580
a. Variable(s) entered on step 1: TAL, RSS new.							

Table 10: Multiple linear regression (MLR) data for duration of hospital stay.

	Coefficient (a)								
	Unstandardized coefficients Standardized coefficients								
Mode	el	В	Std. Error	Beta	t	Sig.			
1	(Constant)	-0.335	0.351		-0.955	0.34			
	TAL	3.592	0.239	0.621	15.052	0			
	RSS2	1.335	0.208	0.265	6.414	0			
a. De	a. Dependent variable: Hospi _stay								

Table 11: Pearson correlation for duration of hospital stay.

		Correlations				
		Hospi_stay	Mod TAL	RSS		
	Hospi_stay	1	0.728	0.766		
Pearson correlation	Mod TAL	0.728	1	0.988		
	RSS	0.766	0.988	1		

# **DISCUSSION**

In the present study total 290 children in the age group 1 day to 12 years were enrolled who were having ARI during the period 1 May 2017 to 31 January 2018 and during this period a total of 1153 patients were admitted in pediatric ward thus giving incidence of 25.15% which lies in the range given by IMNCI 2003. Among the total 290 patients 177 were male (61.03%) and 113 were female (38.96%) (giving male to female ratio of 1.56:1). This finding is similar to the finding of Yumiko Miyaji et al, Amy S Feldman et al, and McCallum G.B. et al, which also had more male patient than female patient.

Incidence of ARI was also higher in younger age group (of the total 290 patients 143 (49.31%) were infants, 97 (33.44%) were toddlers, 24 (8.27%) were preschool and 26 (8.96%) were school going.

Studies have described previous scoring systems for pediatric respiratory infections namely, Gorelick MH et al, Chalut DS et al, Arnold DH et al, Reed C et al, Fujitsuka A et al, and clarified that respiratory rate, wheezing, retraction, and SpO<sub>2</sub> are all useful criteria for the assessment of respiratory status and as these parameters are also part of the severity scoring system being studied here so this will also lead to better classification and treatment decision.<sup>7,17-20</sup>

In the present study efforts have been made to validate and compare two respiratory severity scoring system namely. Modified TAL and RSS (Respiratory Severity Score) over the entire spectrum of acute respiratory illnesses and in the Indian context which makes this study unique. Simultaneous comparison of above two mentioned respiratory severity scores were made to see which scoring system predicted well the outcome in terms of oxygen requirement and duration of hospitalisation.

When these severity scoring systems were applied it was found that among hospitalized patients majority in Mod TAL criteria were in Mild group (244 out of 290 that is 84.13%) and in RSS severity score system were in Severe group (158 out of 290 that is 54.48, finding consistent with Amy S Feldman et al, in which number of patients in severe group in hospitalized patient were more). 14

# In the present study with respect to patient characteristics

As per the table number 3 which shows that respiratory tract infections tend to more in younger age group and more common in male children, finding similar to "Health indicators in National Health Profile", 2009 Govt of India9.It is obvious from this study that 82.75% of

ARI in children present before the age of 3 years with overall male to female ratio being 1.56 (177/113).

Table number 6 shows that as the severity increases the number of patients requiring oxygen is also increasing. On application of chi square test to this, p value comes out to be 0.00, which is statistically significant denoting that there is significant difference in oxygen requirement among different groups, with higher the group higher is the requirement of oxygen. Similar result was also obtained in the study conducted by Inbal Golan-Tripto et al, which showed that first score at admission is fair predictor of oxygen requirement at 48 hours.<sup>21</sup>

# Duration of hospitalisation and modified TAL

Table number 6 shows duration of hospitalisation is increasing with the increase in severity. On application of ANOVA test for duration of hospitalization, p value comes out to be 0.00 which is less than 0.05. So, the relation between duration of hospitalisation and severity groups of Modified TAL (Mild, Moderate and Severe) is statistically significant. More the severity more will be duration of hospitalisation. This finding is similar to the findings of Inbal Golan -Tripto et al, who have proved in their study that first score at admission is fair predictor of length of stay in hospital at 72 hours.<sup>21</sup>

# Oxygen requirement according to RSS

Table number 8 shows that percentage of patients requiring oxygen therapy has increased from mild to severe group. On application of chi-square test to this result, p value comes out to be 0.00 (less than 0.05), which is highly statistically significant. Thus denoting that positive correlation is present between severity group and oxygen requirement, so as the severity group increases requirement increases.

# RSS and duration of hospitalisation

According to Table number 8 duration of hospitalisation in mild and severe group is 4.59±1.462 and 7.11±2.636 respectively. On application of ANOVA test to this, p value obtained is 0.00 (less than 0.05), denoting statistically significant relationship. So, as the severity increases, the duration of hospitalisation increases.

On extensive review no literature could be found comparing oxygen requirement and duration of hospitalisation with severity groups of RSS severity scoring system but as RSS is derived from Modified TAL. According to Amy S. Feldman et al, this RSS system must also be able to grade the severity of ARI on the basis of oxygen requirement and duration of hospitalisation as is the outcome with this study.<sup>14</sup>

Analysis of the Modified TAL and RSS scoring system to see which one among them is better predictor of oxygen requirement.

Binary Logistic Regression test was applied to test which scoring system is better predictor of oxygen requirement which gave Exp(B) for Mod TAL as 0.011 and for RSS as 0.071 (Table 9), as greater is the value of Exp(B) greater is the association so RSS has the stronger association with oxygen requirement when the severity group is changed followed by Mod TAL.

Modified TAL and RSS scoring systems for prediction of duration of hospitalisation

In each of the two scoring systems there is significant increase in duration of hospitalisation when the grade in the scoring system changes. So each scoring system was able to differentiate severity based on duration of hospitalisation. To make out which severity scoring system is better predictor of duration of hospitalisation Multiple Linear Regression Test was used with dependent variable as duration of hospital stay and independent variable as Mod TAL and RSS, result shows that per unit change in Mod TAL will change the duration of hospital stay by 3.592 days and 1.335 days in RSS. This shows that Mod TAL is better predictor.

But due to the suppressor effect of RSS we look at the Pearson correlation between them (Table 11), which shows that, r value for duration of hospital stay for RSS is 0.766 and for Mod TAL r value is 0.728. This indicates that RSS is better predictor.

# **CONCLUSION**

Hence to conclude ARI's constituted 25.15% of the total patient who were hospitalised. On comparing scoring systems of ARI (Modified TAL and RSS), both the scoring systems predicted that on admission if the score is more than chances of requirement of oxygen is more and also duration of hospitalization is more .Among the two scoring systems RSS is better predictor of oxygen and duration of hospitalization than Mod TAL in present study.

# Recommendations

Thus, these clinical scoring systems may be useful and applicable in hospital and prehospital settings for triage and assessment of respiratory status by medical staff at the initial bedside examination.

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Institutional Ethics Committee

### REFERENCES

 Williams BG, E. Gouws, C. Boschi Pinto, J. Bryce, L. Dye. Estimates of worldwide distribution of child deaths from acute respiratory infections. Lancet Infectious disease. 2002.2:25-32.

- Level and trends in child mortality. Report 2014.
   United Nations Inter Agency Group for child mortality estimation. UNICEF, WHO, The World Bank. United Nations Population Division New York 2014. Available at: https://data.unicef.org/resources/levels-trends-child-mortality-report-2014/. Accessed 20 August 2018.
- 3. Global Health Observatory. Proportion of Child deaths cause WHO, Geneva. Available at: http://www.who.int./gho/child\_health/en/index.htm. Accessed 15 September 2018.
- Ahmad OB, Lopez AD, Inoue M. The decline in child mortality: a repraisal. Bull WHO. 2000;78:1175-91.
- Technical bases for the WHO recommendations on the management of pneumonia in children at firstlevel health facilities. WHO/ARI/91:20. Available at:
  - http://whqlibdoc.who.int/hq/1991/WHO\_ARI\_91.20 pdf. Accessed 15 September 2018.
- Revised WHO classification and treatment of pneumonia in children at health facilities: evidence summaries. Integrated Management of Childhood Illness (IMCI). WHO recommendations on the management of diarrhoea and pneumonia in HIVinfected infants and children. Geneva: World Health Organization; 2010. Available (http://www.who.int/maternal\_child\_adolescent/doc uments/9789241548083/en AND Recommendations for management of common childhood conditions, Evidence for technical update of pocketbook recommendations. Geneva: World Health 2012.Available Organization; http://www.who.int/maternal child adolescent/docu ments/management childhood conditions/en. Accessed 15 September 2018.
- 7. Reed C, Madhi SA, Klugman KP, Kuwanda L, Ortiz JR, Finelli L, et al. Development of the Respiratory Index of Severity in Children (RISC) Score among Young Children with Respiratory Infections in South Africa. PLOS ONE. 2012;7(1):e27793.
- Bassani DG, Kumar R, Awasthi S, Morris SK, Paul VK. Causes of neonatal and child mortality in India: a nationally representative mortality survey, Million Death Study Collaborators. Lancet. 2010;376:1853-60.
- 9. Government of India, Health Status Indicators in National Health Profile, 2009, Available at: http://cbhidghs.nic.in/WriteReadData/l892s/File101 2.pdf. Accessed 15 September 2018.
- WHO, Health Situation in South-East Asia Region 1994-97, Regional office for SEAR, New Delhi, India; 1999. Available at: http://apps.searo.who.int/PDS\_DOCS/B4560.pdf. Accessed 15 September 2018.
- 11. United Nations Children's Fund (UNICEF)/World Health Organization (WHO), Pneumonia: the forgotten killer, WHO, New York, NY, USA; 2006. Available at:

- https://www.who.int/maternal\_child\_adolescent/doc uments/9280640489/en/.Accessed 23 September 2018.
- 12. World Health Organization and Government of India, Students Handbook for IMNCI: Integrated Management of Neonatal and Childhood Illness, WHO India Country Office, New Delhi, India,2003. Available at: http://www.health.gov.bt/wp-content/uploads/ftps/imnci/IMNCI%20for%20RIHS /IMNCI%20Students% 20 Handbook. pdf Accessed 23 September 2018.
- 13. Tal A, Bavilski C, Yohai D, Bearman JE, Gorodischer R, Moses SW. Dexamethasone and salbutamol in the treatment of acute wheezing in infants. Pediatrics. 1983;71:13-8.
- 14. Feldman AS, Hartert TV, Gebretsadik T, Carroll KN, Minton PA, Woodward KB, Larkin EK, Miller EK, Valet RS. Respiratory severity score separates upper versus lower respiratory tract infections and predicts measures of disease severity. Pediatr Allergy Immunolo Pulmonol. 2015;28(2):117-20.
- 15. Miyaji Y, Sugai K, Nozawa A, Kobayashi M, Niwa S, Tsukagoshi H. Pediatric respiratory severity score (PRESS) for respiratory tract infections in children. Austin Virol Retrovirol. 2015;2(1):1009.
- McCallum GB, Morris PS, Wilson CC, Versteegh LA, Ward LM, Chatfield MD, Chang AB. Severity scoring systems: are they internally valid, reliable and predictive of oxygen use in children with acute bronchiolitis?. Pediatr Pulmonol. 2013;48(8):797-803.
- 17. Gorelick MH, Stevens MW, Schultz TR, Scribano PV. Performance of a novel clinical score, the Pediatric Asthma Severity Score (PASS), in the evaluation of acute asthma. Academic emergency medicine. Acad Emerg Med. 2004;11:10-8.
- 18. Chalut DS, Ducharme FM, Davis GM. The Preschool Respiratory Assessment Measure (PRAM): a responsive index of acute asthma severity. J Pediatr. 2000;137:762-8.
- 19. Arnold DH, Gebretsadik T, Abramo TJ, Moons KG, Sheller JR, Hartert TV. The RAD score: a simple acute asthma severity score compares favorably to more complex scores. Ann Allergy Asthma Immunol. 2011;107:22-8.
- 20. Fujitsuka A. Lower respiratory infection with respiratory virus associates to bronchial asthma in children. Allerugie. 2011;60:1393.
- Golan-Tripto I, Goldbart A, Akel K, Dizitzer Y, Novack V, Tal A. Modified Tal Score: Validated score for prediction of bronchiolitis severity. Pediatr Pulmonol. 2018;53(6):796-801.

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