ORIGINAL RESEARCH

To compare the AIOS score with the radiological findings in children with respiratory disease

[1]Dr. Sandeep Goel, [2]Dr. Prachi Gupta

[1]Assistant Professor, Department of Radio Diagnosis, Major S D Singh Medical College & Hospital, Farrukhabad, Uttar Pradesh, India
[2]Assistant Professor, Department of Pediatrics, Major S D Singh Medical College & Hospital, Farrukhabad, Uttar Pradesh, India

Corresponding Author
Dr. Prachi Gupta
Assistant Professor, Department of Pediatrics, Major S D Singh Medical College & Hospital, Farrukhabad, Uttar Pradesh, India

ABSTRACT
Aim: To compare the AIOS score with the radiological findings in children with respiratory disease. **Material and methods:** Total 50 Children in the age group of 2 months -59 months with fever less than 3 days, with cough or difficult breathing with any of the following: Fast breathing, chest in drawing, stridor in calm child, grunting, lethargy, convulsions, inability to drink wereincluded in this study. Children with Illness duration >2 weeks, respiratory distress with prominent wheezing, upper respiratory infections with less severe respiratory symptoms, ex; acute otitis media, acute pharyngitis etc. were excluded from this study. **Results:** The 50 children who fit in the inclusion criteria were included in this study in and scored according to acute illness observation scale. There were 5 children who scored 10 andshowed no clinical features of respiratory distress. In the 12 children who scored 11-15 there was mild to moderate respiratory distress and there were 33 children with severe respiratory distress who scored >16. Among the 50 children 6% of the children had normal x-rays. Hyperinflation pertinent to bronchiolitis was seen in 26 children, End point consolidation (include dense opacity that may be a fluffy consolidation) suggestive of lobar pneumonia was present in 17 patients (34%). Non end point infiltrates defined as linear andpatchy densities with peribronchial thickening and many areas of atelectasis pertinent to bronchopneumonia was seen in 12 patients (24%). **Conclusion:** AIOS scoring is useful in predicting abnormal x-ray findings and severity of diseasein respiratory illness in 2-59 months old children.
Keywords: AIOS score , Radiological findings, Respiratory disease

INTRODUCTION
Worldwide, respiratory diseases are a significant cause of morbidity in the pediatric age group. It is one of the most usual reasons with which parents bring their children to pediatric OPD as well as an emergency unit.[1] The burden of ARI is significantly more in developing countries when compared to industrialized countries due to various reasons. In developing countries, the incidence of ARIs in children aged less than 5 years is about 0.29 episodes per child-year accounting for up to 151 million new episodes per year. Whereas in developed countries about 5 million new cases occur each year which is approximately 0.05 episodes per child year.[2] 12-20 of every 1000 children born per year succumb to death before 5 years of life. This shows that pneumonia accounts for about 21% of all deaths in these children.[3] Hence, it is important to formulate criteria for the effective and optimal management of Pneumonia in less developed countries. AIOS is a threepoint scale with a total score ranging from 6-30. It has 6 ordinal components. If the AIOS score is 10 or less than 10, the incidence of significant bacterial infection is less than 2- 3%, whereas the incidence rises to 26% for scores between 11-15 and92% for scores equal to 16 or more.[4] Hence this score was used in the study to validate the correlation with radiological abnormalities and pulse oximetry reading in children with ARI. IMNCI strategy will be more effective when supplemented by an illness severity scoring system that can quickly quantify the

severity of illness at all stages from onset to recovery.[4] In this regard use of Acute Illness Observation Scale (AIOS), a generic illness severity scale developed by P.L. McCarthy, based on simple observations instead of complex symptomatology, is found to be useful. [5,6] AIOS focuses on six easily observed factors that, taken together, are a sensitive, indicator of serious illness in children. Total score of AIOS ranges from 6-30.[7] Hence the aim of the present study to compare the acute illness observational scale with radiological findings in children with respiratory illness at tertiary health care centre.

MATERIAL AND METHODS

This was a prospective, observational study was done in the Department of Paediatrics for one year. Total 50 Children in the age group of 2 months -59 months with fever less than 3 days, with cough or difficult breathing with any of the following: Fast breathing, chest in drawing, stridor in calm child, grunting, lethargy, convulsions, inability to drink were included in this study. Children with Illness duration >2 weeks, respiratory distress with prominent wheezing, upper respiratory infections with less severe respiratory symptoms, ex; acute otitis media, acute pharyngitis etc. were excluded from this study.

Table 1: AIOS score: composition and score description

Variables	Score = 1	Score=3	Score=5
Quality of Cry	Strong cry withnormal tone or contented and not crying	Whimpering or sobbing	Weak cry/ moaning,or high- pitched cry
Reaction to Stimulation toparent	Cries briefly andstops, or is content and not crying	Cries on and off	Cries continuously or responds hardly
State Variation	When awake, staysawake, or if stimulated while sleeping, awakens quickly	Closes eyes for shortperiod when awake, or awakens whenstimulated for long time	Fast asleep or not arousable
Color	Pink	Pale extremities /acrocyanosis	Pale/ cyanotic/,mottled /ashen
Hydration	Normal skin and eyesand moist mucous membranes	Normal skin and eyes,mouth slightly dry	Poor recoiling ofskin, mucousmembranes dry and/or eyes sunken
Response tosocial overtures	Smiles or alerts	Smiles for a brief period or alerts briefly	No smile, anxious face, no expressions,or not alert

RESULTS

The 50 children who fit in the inclusion criteria were included in this study in and scored according to acute illness observation scale. In those children it was observed that 90% of children with respiratory illness scored abnormally (AIOS>10) at initial evaluation. The mean score for AIOS on Day 1 was around 19. Based on the score the children were grouped and correlated with x-ray abnormalities. There were 5 children who scored 10 and showed no clinical features of respiratory distress. In the 12 children who scored 11-15 there was mild to moderate respiratory distress and there were 33 children with severe respiratory distress who scored >16. Among the 50 children 6% of the children had normal x-rays. Hyperinflation pertinent to bronchiolitis was seen in 26 children, End point consolidation (include dense opacity that may be a fluffy consolidation) suggestive of lobar pneumonia was present in 17 patients (34%). Non end point infiltrates defined as linear andpatchy densities with peribronchial thickening and many areas of atelectasis pertinent to bronchopneumonia was seen in 12 patients (24%).

The other radiological abnormalities which were rare in the study were steeple sign (4%), shock lung (4%) and pleural effusion (2%).

Table 2: Gender distribution of patients

Gender	No. of patients =50	Percentage
Male	28	56
Female	22	44

Table 3: X-ray findings of patients

X-ray findings	No. of patients	Percentage
Normal study	3	6
Hyperinflation	13	26
End point infiltrates	17	34
Non end point infiltrates	12	24

Steeple sign	2	4
Shock lung	2	4
Pleural effusion	1	2
Total	50	100

Comparison of AIOS score and radiological abnormalities

Hyperinflation (Bronchiolitis) was present in 13 children of which 2 scored 11-15, and 10 of the patients were in >16 group. Radiological abnormalities suggestive of pneumonia was seen in 28 patients of which 7 children were in 11-15 group and 21 scored >16 of AIOS score. There was noteworthy difference in the frequency of x-ray abnormalities between children who scored <10 and children who scored >16.

Table 4: Comparison of AIOS score and radiological findings

X-ray	AIOS Level			Total
	<10	11-15	>16	
Normal study	1	1	1	3
Hyperinflation	1	2	10	13
End point infiltrates	3	4	10	17
Non end point infiltrates	0	5	7	12
Steeple sign	0	0	2	2
Shock lung	0	0	2	2
Pleural effusion	0	0	1	1
Total	5	12	33	50

The other radiological abnormalities of steeple sign (Acute laryngo tracheo bronchitis), shock lung (ARDS), pleural effusion fell only in the >16 group. The significance of AIOS score in predicting abnormal x-rays in ARI was analysed and was found to be statistically significant (p value = 0.002).

DISCUSSION

In underdeveloped and developing countries, Childhood pneumonia is one of the most common infective illnesses. It holds a pivotal role as it is one of the preventable causes of mortality in children. In comparison to the traditional history taking and physical examination which has poor sensitivity, our study showed that history and examination when combined with AIOS scoring have a higher sensitivity and correlation for serious illness. Childhood pneumonia clearly represents one of the most common infective illnesses in developing countries and is of great importance as a cause of preventable mortality in children. Mc Carthy et al, had already demonstrated that AIOS is useful in identifying febrile children who have serious illness.[8,9]

McCarthy PL et al in 1982 conducted a study to determine if observational assessment performed in a systematic manner adds to the effectiveness of the method of traditional history taking and physical examination in identifying serious illness in febrile children. To determine the sensitivity of the combined evaluation, he sequentially evaluated children of less than 24 months of age who presented with fever.[7] This study showed that combination of AIOS scoring, history, and physical examination had a higher sensitivity and correlation for serious illness than did the traditional history and physical examination alone. Three children who had serious illness but showed no abnormalities on history and physical examination, were identified only by the use of AIOS. This AIOS

scoring system was studied by Bhavneet Barathi et al for assessing its usefulness in managing severe childhood pneumonia in 2-59 months.[10] Akash Bang et al and Rajesh VT et al used this score for prediction of bacteremia in children aged <36 months with fever.[11,12] Walker CL et al compared AIOS score with IMCI and studied its sensitivity and specificity in prognosticating children with pneumonia in the age group of 2 to 59 months.[13] In the current study AIOS score was correlated with radiological abnormalities in acute respiratory illness in 2-59 months. In the x-ray abnormalities the most common were end point infiltrates (34%), hyperinflation (26%) and non end point infiltrates (24%). It was found that in the cases of hyperinflation (bronchiolitis) 66% of the findings were in children who scored >16. That is the frequency of abnormal radiological findings were more if they scored >16 of AIOS score in a acute respiratory infections. This correlation was found to be significant (p value=0.002). Similar observation was noticed in Walker CL et al.[13] study were when the AIOS score was <10 in cases of community acquired pneumonia 77.5% of x-rays were normal.

CONCLUSION

AIOS scoring is useful in predicting abnormal x-ray findings and severity of disease in respiratory illness in 2-59 months old children .

REFERENCES

1. Armon K, Stephenson T, Gabriel V. Determining the common medical problems presenting to an accident

and emergency department. Arch Dis Child. 2001;84(5):390–392.

2. Rudan I, Boschi-Pinto C, Biloglav Z, Mulholland K, Campbell H. Epidemiology and etiology of childhood pneumonia. Bull World Health Organ. 2008;86(5):408–424.

3. Williams BG, Gouws E, Boschi-Pinto C, Bryce J, Dye C. Estimates of world-wide distribution of child deaths from acute respiratory infections. The Lancet Infectious Diseases. 2002;2(1):25–32.

4. Bharti B, Bharti S, Verma V. Role of Acute Illness Observation Scale (AIOS) in managing severe childhood pneumonia. Indian J Pediatr. 2007;74(1):27–32.

5. Mc Carthy PL, Jekel JF, Stashwick CA, Spiesel SZ, Dolan TF Jr. History and observation variables in assessing febrile children. Pediatrics. 1980;65:1090- 5

6. Mc Carthy PL, Jekel JF, Stashwick CA, Spiesel SZ, Dolan TF, Sharpe MR et al. Further definition of history and observation variables in assessing febrile children. Pediatrics. 1981;67:687-93.

7. McCarthy PL, Sharpe MR, Spiesel SZ, Dolan TF, Forsyth BW, DeWitt TG, et al. Observation scales to identify serious illness in febrile children. Pediatric. 1982;70:802-9

8. Mc Carthy PL, Lembo RM, Baron MA, Fink HD, Cichetti DV. Predictive value of abnormal physical examination findings in ill-appearing and wellappearing febrile children. Pediatrics. 1985;76:167- 171.

9. Mc Carthy PL, Lembo RM, Baron MA, Fink HD, Cichetti DV. Observation, history and physical examination in diagnosis of serious illnesses in febrile children. J Pediatr. 1987;110:26-30.

10. Bhavneet Bharti et al AIOS in managing severe childhood pneumonia Indian Journal of Pediatrics Volume 74-January, 2007.

11. Akash Bang et al Yale observation Scale for Predicion of Bacteremia in Febrile children; Indian Journal of paediatrics, Vol76-June,2009.

12. Rajesh VT, Singhi S, Kataria S. Tachypnea is a good predictor of hypoxia in acutely ill children. Arch Dis Child. 2000;82:46-9

13. Walker CL, Rudan I, Liu L, Nair H, Theodoratou E, Bhutta ZA et al. Global burden of childhood pneumonia and diarrhoea. Lancet 2013;381(9875):1405–16